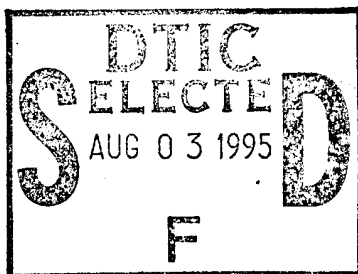


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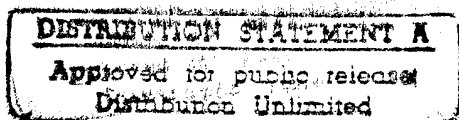
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*Defense Modeling and Simulation  
Office Data and Repositories  
Technology Working Group (DRTWG)  
Meetings Held February 7-10, 1995  
and Additional Task Force and  
Subgroup Meetings Held Between  
July 1994 and February 1995*

*Edited by Iris M. Kameny*



**National Defense Research Institute**

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Subgroup Meetings Held Between  
July 1994 and February 1995*

*Edited by Iris M. Kameny*

*Prepared for the  
Office of the Secretary of Defense*

**National Defense Research Institute**

## **PREFACE**

This document contains the notes from the Defense Modeling and Simulation Office (DMSO) Data and Repositories Technology Working Group (DRTWG) meeting and related Task Force meetings held at the Institute for Defense Analyses (IDA) during February 7-10, 1995. It also contains notes for DRTWG Task Force and Subgroup meetings held between the previous Information/Database Technical Working Group (I/DBTWG) meetings during the week of July 11-15, 1994 and the DRTWG meetings in February. (Note that the DRTWG was formerly known as the I/DBTWG).

The work described here was performed for the DMSO as part of its initiative to strengthen the use of modeling and simulation throughout DoD. RAND's participation in this effort was performed for DMSO within the Acquisition and Technology Policy Center of RAND's National Defense Research Institute (NDRI), a federally funded research and development center sponsored by the Office of the Secretary of Defense, Joint Staff and the defense agencies.

This work should be of interest to those working in the areas of interoperability of information systems, information resource management (IRM), data dictionary systems, resource directories, resource repositories, data modeling and use of IDEF tools, complex data, data verification, validation, and certification (VV&C), data quality, data/information security, and assessment of data management technology.



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## SUMMARY

This document contains the notes from the Defense Modeling and Simulation Office (DMSO) Data and Repositories Technology Working Group (DRTWG) meeting and related Task Force meetings held at the Institute for Defense Analyses (IDA) during February 7-10, 1995. It also contains notes for DRTWG Task Force and Subgroup meetings held between the previous Information/Database Technical Working Group (I/DBTWG) meetings during the week of July 11-15, 1994 and the DRTWG meetings in February. (Note that the DRTWG was formerly known as the I/DBTWG).

Because data is critical to Modeling and Simulation, the main and continuing purpose of the DRTWG is to enable data providers to provide the M&S community, with cost-effective, timely, verified and valid data to promote reuse and sharing of data, interoperability of models and simulations, and improved credibility of modeling and simulation results.

The DoD Corporate Information Management (CIM) initiative continues to address many of the data related needs of the M&S community but not all. It is important for the M&S community to be aware of the data needs not being met by CIM and unlikely to be met by commercial or other DoD means. These data needs should be brought to the attention of the DoD Data Administrator and, if DoD attention to them is not timely or appropriate, then they should be addressed by the M&S community through the Defense M&S Master Plan (draft issued in January 1995) and Investment Plan and the M&S Data Administration Strategic Plan (DASP) submitted in April 1995. It is critical that the DRTWG continue to monitor DoD CIM activities and help DMSO develop compatible M&S guidelines and procedures whenever possible.

The DRTWG is currently co-chaired by Dr. Chien Huo, an Associate Director of DMSO, and by Ms. Iris Kameny, an Associate Director of the RAND Acquisition and Technology Policy Center, who has been supporting DMSO since 1991 in their data related activities. Dr. Huo and Ms. Kameny are working with CDR Gary Misch, the Technical Director of DMSO, and with COL Jerry Wiedewitsch, the Deputy Director of DMSO.

The DRTWG has grown from around a dozen members at its inception to over 200 members today. It consists of people from the Services, Joint Staff, DoD agencies, Intelligence Community, ARPA, NIST, NASA, OSD, FFRDCs, and contractors working on government M&S programs. The DRTWG currently meets twice a year. The DRTWG has four Task Forces, several of which have Subgroups. The co-chairs of the Task Forces and Subgroups are predominantly from the Services. The DRTWG Task Forces and Subgroups meet more frequently as needed.

Because of its size, the DRTWG has become more of an information exchange forum for the data suppliers to the M&S community than an action body. Members make requests for information and the meeting agenda is developed according to the expressed needs. In addition, DRTWG members and others are invited to brief about their M&S projects, database environments and centers to support M&S, and non-M&S oriented databases and systems used by the M&S community. This exchange has been very helpful in getting different organizations to know each other and work together toward exchanging and reusing databases rather than developing redundant databases.

DRTWG information and reports can be accessed through the M&S Information System via Internet gopher at [gopher.dmsomil](mailto:gopher.dmsomil) or through the interim M&S Resource Repository (iMSRR) via the World Wide Web: <http://huachuca-jdbe.army.mil/> or <http://www.dmsomil/>

Accomplishments of the DRTWG include:

- Support of DMSO in becoming the delegated Functional Data Administrator (FDAd) for the M&S functional area.
- Development of the Modeling and Simulation Data Administration Strategic Plan (DASP) for FY 1995-2002.
- Development of the initial M&S Information System (MSIS), the DRTWG part of the MSIS, and the first interim M&S Resource Repository (iMSRR) node.
- Development of initial data models and standards for M&S Community Directories to include a Database Directory, a Model and Simulation Directory, and an Authoritative Data Sources Directory (each can be used as a "standard" core by different organizations enabling sharing of directory information across the M&S community).
- Development of a methodology to build subject area information data models through reverse engineering of legacy databases and M&S applications, and training organizations in carrying out these activities utilizing IDEF modeling techniques.
- Definition of complex data; being instrumental in getting CIM to address complex data and derived data in their new Defense Integrated Repository System data model; and completion of an initial pilot study of modeling complexly derived data using the Army TRAC weapon performance data (e.g., probability hit, kill) and sharing the lessons learned with the community.
- A paper on "Distributed Interactive Simulation (DIS) Needs for DoD Data Standards," which was instrumental in forming the DIS Special Interest Group (SIG) for Data Standards and Repositories (DSR), which is being co-chaired by Dr. Huo, who also co-chairs the DRTWG.
- Development of data verification, validation, and certification definitions for data producers and users

To expedite work in data related support for M&S, the DRTWG has four Task Forces in the areas of Repositories, Data Standards, Data Security Requirements and Data VV&C.

Specific tasks being addressed by the Repositories Task Force include:

- Addressing needs and requirements (including security, protection and configuration management) for the unclassified iMSRR based on the Internet WWW and for the classified iMSRR which may be based on Intelink-S; implementing the iMSRR node development plan; and evaluating its use to provide lessons learned for development of the longer range distributed MSRR (based on a common architecture).
- Developing the concept of operations and requirements (including information security, protection and configuration management) for a distributed M&S Resource Repository system (client/server model) that can meet M&S repository needs for managing metadata, instance data, algorithms, models and simulations, and tools.

Specific tasks to be addressed by the Data Standards Task Force include:

- Working with the M&S FDAd to define policy and procedures for carrying out M&S data standardization activities.
- Exploring the use of advanced modeling tools for modeling complex data in a more user friendly way, developing metadata extensions to describe complex data, and sharing the findings with the DISA/JIEO Center for Software.

- Performing pilot studies on complex data, in particular on weapons performance data for the Navy and Air Force to complement the previous pilot study of Army weapons performance data.

Tasks to be performed by the Data Security Requirements Task Force include:

- Identifying official policy regarding administration, release, use, and modification of data, models, and simulations. Identifying policy conflicts and producing a plan for handling them so that users can access and use the data and M&S they need.
- Performing a data security requirements survey to do an analysis and derive the best set of requirements. Then assessing the gap between the requirements and the capabilities of current DBMS security products and making recommendations of M&S data systems that could be implemented in the ARPA testbed using DBMS security products/methods to verify the requirements and behavior of the systems.
- Aiding the iMSRR and MSRR development and requirement teams in understanding the security and protection requirements and techniques available and helping them make security-related architectural decisions.

Specific tasks being addressed by the Data VV&C Task Force include:

- Carrying out VV&C tasks to determine data VV&C procedures and guidelines for M&S non-DIS users, DIS users, and data producers.
- Developing a data quality profile to describe the condition of a dataset or database (e.g., completeness, accuracy, resolution, audit trail, derivation, and the V&V tests applied to the data) and requiring that the profile be part of the data certification process as well as a part of the M&S Verification, Validation, and Accreditation process.
- Addressing Authoritative Data Sources: Developing taxonomy of data areas, identifying authorities for those areas, developing a directory of the authorities, and a guideline to responsibilities of an Authoritative Data Source. Defining the roles of M&S data centers that receive data from authoritative sources and prepare it for input to models.
- Working with the DIS Verification, Validation and Accreditation (VV&A) WG and the DMSO VV&A TWG to integrate the data VV&C process into DIS and non-DIS VV&A processes.

## **ACKNOWLEDGMENTS**

The DRTWG co-chairs would like to thank Ms. Ruth Eagle of RAND for her efforts in preparing this document.

## **1.0 INTRODUCTION**

### **PURPOSE**

The purpose of this document is to provide to DRTWG members notes of the February 7-10 Defense Modeling and Simulation Office (DMSO) Data and Repositories Technology Working Group (DRTWG) meetings, and notes from other DRTWG Task Force and Subgroup meetings held since the previous I/DBTWG meeting in July 1994. In addition, it provides information to people who wish to participate in the DRTWG and those with an interest in data activities related to modeling and simulation.

### **BACKGROUND**

In 1991, the Deputy Secretary of Defense instituted a major new initiative to strengthen the application of modeling and simulation (M&S) in the DoD. Its purpose is to promote the effective and efficient use of M&S in joint education, training and military operations, research and development, test and evaluation, analysis, and production and logistics by: (1) establishing Office of the Secretary of Defense (OSD) cognizance and facilitating coordination among DoD M&S activities; (2) promoting the use of interoperability standards and protocols where appropriate; and (3) stimulating joint use, high return on M&S investment. Achievement of these goals requires the development and implementation of a DoD M&S policy, establishment of a DoD-wide management structure to coordinate joint M&S activities and requirements, and the formulation and implementation of a long range M&S joint investment strategy.

The then-USD(A) established the Defense Modeling and Simulation Office (DMSO) on June 21, 1991 to serve as the executive secretariat for the Executive Council on Modeling and Simulation (EXCIMS) and to provide a full-time focal point for information concerning DoD modeling and simulation (M&S) activities. Currently, the DMSO promulgates USD(A&T) directed M&S policy, initiatives, and guidance to promote cooperation among DoD components to maximize efficiency and effectiveness.

To carry out its functions and develop a master plan, the DMSO enlisted the help of several Federally Funded Research and Development Centers (FFRDCs). A number of functional and technology working groups were established to determine the M&S needs and to evaluate the state-of-the-art with respect to those needs. The Functional Working Groups are: Education, Training and Military Operations (ETMO); Research and Development; Test and Evaluation; Analysis; and Production and Logistics. The current Technology Working Groups are: Architecture; Data and Repositories; Environmental Representations; Systems/Verification, Validation and Accreditation; and Human Behavior Representations.

The current DRTWG grew out of two original TWGs: The Information TWG and the Database TWG. During initial startup activities in January 1992, the Information Technology Working Group (ITWG) began to develop plans and design of a DMSO Information System to facilitate coordination among DoD M&S activities. The Database Technology Working Group (DBTWG) identified three efforts found critical to M&S needs: (1) need for directories, dictionaries, encyclopedias, and repositories to support timely and cost effective access to, acquisition of, and validation of external and derived databases; (2) interoperability, data integrity and consistency across distributed databases and simulations; and (3) M&S community objective assessment of data management products such as relational DBMSs. COL Jim Shiflett, former Technical Director of DMSO, asked that the two TWGs be joined into the I/DB Task Group which was

done. Recently, upon DMSO resurrection of the TWGs, the name of the I/DB Task Group was changed to the DRTWG.

Three documents describing earlier I/DBTWG activities are: (1) Defense Modeling and Simulation Office Information/Database Technology Working Group (I/DBTWG) Meetings Held During the Week of July 11-15, 1994, CF-115-OSD; (2) Defense Modeling and Simulation Office Information/Database (I/DB) Task Group Meetings Held February 14-18, 1994, and Notes from the Previous Two I/DB Meetings, RAND CF-114-DMSO, 1994; and (3) Database Technology Activities and Assessment for Defense Modeling and Simulation Office (DMSO) (August 1991 - November 1992), RAND MR-130-ACQ, 1994.

The DRTWG is currently co-chaired by Dr. Chien Huo, an Associate Director of DMSO, and by Ms. Iris Kameny, an Associate Director for the RAND Acquisition and Technology Policy Center, who has been supporting DMSO since 1991 in their data related activities. Dr. Huo and Ms. Kameny are working with CDR Gary Misch, the Technical Director of DMSO, and with COL Jerry Wiedewitsch, the Deputy Director of DMSO.

The DRTWG has grown from around a dozen members at its inception to over 200 members today. It consists of people from the Services, Joint Staff, DoD agencies, Intelligence Community, ARPA, NIST, NASA, OSD, FFRDCs, and contractors working on government M&S programs. The DRTWG currently meets twice a year with the next meeting scheduled for August 1-4, 1995 at the Institute for Defense Analyses in Alexandria, Virginia. The DRTWG has four Task Forces (Repositories; Data Standards; Data Security; and Data Verification, Validation & Certification (VV&C)). Several of these task forces have Subgroups. The co-chairs of the Task Forces and Subgroups are predominantly from the Services. The DRTWG Task Forces and Subgroups meet more frequently as needed.

Because of its size, the DRTWG has become more of an information exchange forum for the data suppliers to the M&S community than an action body. Members make requests for information mainly about data standards, repositories, directories, data quality, complex data, etc. and the meeting agenda is developed according to the expressed needs. In addition, DRTWG members and others are invited to brief about their M&S projects, database environments and centers to support M&S, and non-M&S oriented databases and systems used by the M&S community. This exchange has been very helpful in getting different organizations to know each other and work together toward exchanging and reusing databases rather than developing redundant databases.

DRTWG information and reports can be accessed through the M&S Information System via Internet gopher at [gopher.dmsomil](mailto:gopher.dmsomil) or through the interim M&S Resource Repository (iMSRR) via the World Wide Web: <http://huachuca-jdbe.army.mil/> or <http://www.dmsomil/>

## **OBJECTIVES OF THE DRTWG**

Because data is critical to models and simulations, the main and continuing objective of the DRTWG is to support the M&S data administration program to:

- enable data suppliers to provide the M&S community cost effective, timely, and verified and validated data to promote reuse and sharing of data, interoperability of models and simulations, and improved credibility of modeling and simulation results.

To accomplish this goal requires data administration policies, procedures, standards, and supporting tools compatible with those of CIM and the Services. It also requires access to information throughout the M&S community about what is happening as well as information about the existence and availability of models and simulations and the data they need. Of critical

concern to the community, is the quality of the models and simulations as well as the data they use and generate. Current responsibility for meeting data administration objectives is being addressed through the delegation of M&S functional area data administration responsibility to DMSO. Under the direction of the USD(A&T) and the Director, Defense Research and Engineering (DDR&E), DMSO is delegated with the full mission and authority as the Functional Data Administrator (FDAd) for M&S. Dr. Chien Huo is the point of contact for the M&S FDAd and delivered the first Data Administration Strategic Plan (DASP) to the DoD Data Administrator in April 1995.

The DRTWG has worked with the M&S FDAd to address data-related areas in the Draft Defense M&S Master Plan (MSMP) (January 1995), and to develop an investment program to carry out tasks to meet the MSMP activities and milestones. The MSMP identifies six DoD M&S Objectives, most of which have several Sub-objectives. Major DRTWG related activities fall under three of these Sub-objectives: Sub-objective 1-3 will establish data standards to support common representations of data in models and simulations; Sub-objective 5-2 will develop methodologies, standards, and procedures for the VV&A of models and simulations and the VV&C of data used in M&S; and Sub-objective 5-3 will provide a distributed repository system to facilitate developer and end-user access to M&S resources. In addition, the DRTWG efforts will support other MSMP Objectives with relevant data standards and use of the distributed M&S Resource Repositories (MSRR) for providing authoritative representations of the natural environment, systems, and human behavior.

## PLANNED ACTIVITIES

- I. Sub-objective 1-3. The following activities support Sub-objective 1-3 (establish data standards to support common representations of data in models and simulations):

Support for Data Standards. In support of data standards: The M&S FDAd will arrange for registering M&S users on the DDRS; develop M&S Data Administration (DA) procedures for carrying out data standardization; maintain information on M&S standard data resources in the DDRS and on the iMSRR; use the DoD Personal Computer Access Tool (PCAT) for accessing standard data element definitions and for submitting data standards for standardization; and continue developing the reverse engineering methodology to support the development of data models and standards from legacy databases and M&S. The Joint Database Elements (JDBE) project personnel will also be available to M&S data projects for IDEF training and help in developing their data models.

Support for Complex Data. The DRTWG recognized the lack of attention in the CIM community to data standards for scientific and technical data and formed the Complex Data Subgroup of the Data Standards Task Force to address these needs. Much M&S data is not atomic single concept data addressed by the CIM data standardization process (in accordance with DoD 8320.1-M-1) but is complexly derived (e.g., probability hit, kill) structurally complex (e.g., a road network, an object-oriented engineering view of a weapon system) multimedia (e.g., images, graphics, voice) or conceptually complex (e.g., rules, operation orders) data. Complex data tasks will include finding and trying out new data modeling techniques that will be more user friendly and to perform additional pilot studies using these modeling techniques (preferably for Air Force and Navy weapons performance data).

DIS Data Standards: The DIS Data Standards Subgroup presented a paper at the 11th DIS Workshop (September 1994) on "DIS Needs for DoD Data Standards" and was instrumental in the formation of the new DIS SIG on Data Standards and Repositories (DSR) which held its first meeting at the 12th DIS Workshop in March 1995. DMSO is



supporting work for developing a DIS Data Element Dictionary based on objects referred to in DIS PDUs.

Data Security Requirements. This task force will be identifying and resolving data security issues, developing policy and requirements, and recommending policy for data protection, access and sharing.

- II. Sub-objective 5-2: The following activities support Sub-objective 5-2 (develop methodologies, standards, and procedures for the VV&A of models and simulations and the VV&C of data):

Data VV&C. The VV&C Task Force has two Subgroups: The VV&C Guidelines and Quality Profile Subgroup and the Authoritative Data Sources Subgroup.

The Guidelines Subgroup is carrying out several tasks to develop guidelines for the VV&C of data and is working closely with the DMSO VV&A TWG and the DIS Fidelity, Management and Usability Working Group VV&A Subgroup to integrate the data VV&C process into the DIS and non-DIS VV&A processes. Guidelines for data VV&C include the definition of a data quality profile to describe the condition of a dataset or database (e.g., completeness, accuracy, resolution, audit trail, derivation, and the V&V tests applied to the data) and requiring that the profile be part of the data certification process.

The Authoritative Data Sources Subgroup is concerned with the ability of M&S users to find and acquire the instance data they need for their M&S and for that data to be VV&Ced, configuration managed, etc. This Subgroup is developing a taxonomy of data areas, identifying authorities for those areas, developing a directory of the authorities, and a guideline to responsibilities of an Authoritative Data Source. They are also defining the roles of M&S data centers that receive data from authoritative sources and prepare it for input to models and are concerned with release authority issues.

- III. Sub-objective 5-3 The following activities support Sub-objective 5-3 (provide a distributed repository system to facilitate developer and end-user access to M&S resources):

Development of MSRR. DMSO is supporting a project to develop a distributed system of M&S Resource Repositories (MSRR) providing: M&S Community Directories, data standardization resources (e.g., process and data models, data dictionary) algorithms, models and simulations, and the tools for browsing and accessing, linking across resources, configuration management, etc.

Development of M&S Community Directories. This is an ongoing effort to provide a Database Directory, a Model and Simulation Directory, and an Authoritative Data Sources Directory on the iMSRR. Each directory schema can be used as a "standard" core by different organizations enabling sharing of directory information across the M&S community.

M&S Information System (MSIS). The M&S Information System was developed to meet the M&S community's needs for access to information. DRTWG information documents and activities are maintained on the MSIS as well as on the interim MSRR (iMSRR).

## **ORGANIZATION AND STRUCTURE OF THIS DOCUMENT**

This document contains the notes from the DMSO DRTWG meeting and related Task Force and Subgroup meetings held at the Institute for Defense Analyses (IDA) during February 7-10, 1995. In addition, it contains notes for DRTWG Task Force and Subgroup meetings held between the previous Information/Database Technical Working Group (I/DBTWG) meetings in July 1994 and the DRTWG meetings in February.

Section 1 contains the introduction.

Section 2 contains the highlights of the DRTWG meetings held during February 7-10, 1995.

Section 3 contains notes for the main DRTWG meeting held February 7-8, 1995 which includes an update on DMSO happenings; reports from DRTWG task forces and subgroups; updates on data administration, standardization and modeling activities; reports about other organizations; reports from Service M&S organizations with respect to data related activities; reports from the Environmental Representation TWG; and reports from M&S data related projects.

Section 4 contains notes from the Data VV&C Guidelines Subgroup Meeting held on February 8, 1995.

Section 5 contains notes from the Joint VV&A TWG and Data VV&C Task Force Meeting held on February 9, 1995.

Section 6 contains notes from the Authoritative Data Sources Subgroup Meeting held on February 9, 1995.

Section 7 contains notes from the Data Security Requirements Task Force Meeting held on February 10, 1995.

Section 8 contains notes from the Repositories Task Force Meeting held on August 15-16, 1994.

Section 9 contains notes from the Authoritative Data Sources Subgroup Meeting held on September 9, 1994.

Section 10 contains notes from the Repositories Task Force Meeting held on October 17, 1994.

Section 11 contains notes from the Data VV&C Task Force Meeting held on October 18-19, 1994.

Section 12 contains notes from the Authoritative Data Sources Subgroup Meeting held on November 3, 1994.

Section 13 contains notes from the Data Security Requirements Task Force Meeting held on December 14, 1994.

Section 14 contains notes from the Authoritative Data Sources Subgroup Meeting held on December 15, 1994.

Appendix F contains a list of Acronyms.

## 2.0 DRTWG MEETING HIGHLIGHTS

The DRTWG Conference was a success. Dr. Chien Huo of DMSO, Ms. Iris Kameny of RAND, and Services' representatives co-chaired the DRTWG plenary session and its related meetings: Data VV&C Subgroup, Authoritative Data Sources Subgroup, Data Security Requirements Task Force, and the first joint meeting of the M&S VV&A TWG with the DRTWG Data VV&C Task Force. Over 60 people attended, representing the Services, Joint Staff, OSD, DMA, DIA, JIEO/CIM, CINCs, industry and academia. The conference's main focus was on DMSO activities, including the M&S Master Plan, the M&S Data Administration Strategic Plan (DASP) DRTWG Task Force and Subgroup activities, and reports from the Environmental TWG and DMSO funded projects (MSIM, UTSS, VV&A of Distributed Simulations, and the CENTCOM Data Quality Engineering tool). A highlight was COL Jerry Wiedewitsch's discussion of the new DMSO organization, and the M&S Master Plan (with attention to its data related activities). He also discussed DMSO's participation in a number of DoD activities that require attention from the DRTWG, including: The Leading Edge Environment for Global Command and Control (LEEGCCS), the Advanced Joint Planning Advanced Concept Technology Demonstration (AJP ACTD), the Joint Warrior Interoperability Demonstrations (JWID); and the Synthetic Theater of War (STOW) for 97. He also discussed the development of a new generation of simulations, Joint Simulation (JSIMS), based on a High Level Architecture (HLA) that was developed by ARPA. Dr. Chien Huo discussed, in greater detail, the data related parts of the Master Plan, the investment plan, and how the MSMP data-related goals will be achieved.

### Upcoming Activities:

- A new DIS SIG on Data Standards and Repositories has been formed and will meet for the first time at the 12th DIS Workshop in March.
- The next DRTWG meetings will be held August 1-4 at IDA in Alexandria.

### Highlights From the Task Force Subgroup Meetings:

- a. Data VV&C Subgroup Meeting
  - The focus was on the tasks to develop VV&C Guidelines: Task 1 for non-DIS users of M&S, and Task 3 for data producers of data for M&S. (Task 2, for DIS users, will use the results from the DIS VV&A Working Group.)
  - Plans were made for conducting a kickoff meeting in Albuquerque, February 27-28, for Task 1 and Task 3 leaders, supporting organizations, case study representatives and JDBE IDEF0 facilitators.
  - A deliverable was added to the VV&C Task Description for a draft final report by 31 December 1995.
- b. Authoritative Data Sources Meeting:
  - The objectives of this meeting were to (1) determine the status of the JM&S Data Sources Survey; (2) discuss data source responsibility issues; and (3) to finalize the JM&S taxonomy for the data sources directory. Objective (1) was met. Objective (2) resulted in an action item due in by 26 April. Intermediate deadlines are 12 April and 19 April. Objective (3) resulted in the taxonomy being baselined pending final input from working group members, comments from the DRTWG, and action items due in by 28 February.

- c. Data Security Requirements Task Force Meeting:
  - Objectives of the meeting were to follow up on the action items assigned at the previous meeting: briefs on security products (NCSC), releasability, TAFIM Volume 6, Component security policy, Navy Integration Data Management System lessons learned, standard way of labeling, and ways to filter and declassify data.
  - Two security tasks were to get underway to address: categorization of individual M&S data systems data security requirements and suggest technology solutions (MITRE), and definition of policy issues and suggested changes (RAND) -- but the FFRDCs were not able to perform these near-term efforts and the co-chairs were looking into having the tasks performed by the Naval Research Laboratory (NRL).
  - The next meeting will be held after the two security tasks have started. The agenda will include briefs on physical security, data aggregation policy, and Intelink.
- d. Joint VV&A TWG and Data VV&C Task Force Meeting:
  - The objective of the meeting was to familiarize each group with the objectives and accomplishments of the other group so there can be better coordination and cooperation in the future.
  - Dr. Huo will work with Dr. Sanders to identify representatives from the two groups that will coordinate the pilot studies being undertaken.
  - The joint meeting was successful and plans were discussed for having another joint meeting during the August DRTWG meetings.

### 3.0 NOTES FROM NINTH DRTWG MEETING AT IDA

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### 3.1 AGENDA

TUESDAY FEBRUARY 7, 1995

#### UPDATE ON DMSO HAPPENINGS

- 0800 - 0830 Welcome - Introduction: COL Jerry Wiedewitsch
- 0830 - 0900 M&S Master Plan Update: Dr. Chien Huo
- 0900 - 0930 Status of Data Standardization: Ms. Linda Calvert
- 0930 - 1000 Environment TWG Data Needs: Mr. Paul Foley
- 1000 - 1030 Break
- 1030 - 1100 Data Needs for Synthetic Theater of War (STOW): Dr. Randy Garrett

#### REPORT FROM INTELLIGENCE FDAD

- 1100 - 1120 Report from Intelligence FdAd: Mr. Jim Davidson

#### REPORTS FROM DRTWG TASK FORCES AND SUBGROUPS

- 1120 - 1140 VV&C Guidelines Subgroup: Mr. Mark Ralston and Mr. Bob Hartling
- 1140 - 1200 Authoritative Data Sources Subgroup: Mr. Mike Hopkins
- 1200 - 1220 Data Security Requirements Task Force: Ms. Teresa Lunt and Dr. Chien Huo
- 1220 - 1320 Lunch
- 1320 - 1340 Repository Subgroup: Mr. Jim Augins and Mr. Peter Valentine
- 1340 - 1410 WWW Implementation Plans: Mr. Jim Augins and Mr. Pete Valentine
- 1410 - 1430 Data Standards Task Force: MAJ Walt Swindell and Ms. Linda Calvert

#### DMSO FUNDED PROJECTS

- 1430 - 1500 Modeling and Simulation Information Management: Mr. Robert Hulsman
- 1500 - 1530 Break
- 1530 - 1600 Data Quality Engineering Tool Project: Mr. Mike Hopkins
- 1600 - 1630 Universal Threat System for Simulators: Mr. Jim Santangelo
- 1630 - 1700 VV&A of Distributed Simulation Project: Ms Susan Solick

WEDNESDAY FEBRUARY 8, 1995

REPORTS FROM OTHER GROUPS

0800 - 0820 IEEE IDEF1X Working Group: Mr. Peter Valentine

0820 - 0840 Report on Navy Data Administration Program: Ms. Rebecca Wade

REPORT ON THE DMSO DIRECTORIES

0840 - 0910 M&S Directories: Dr. Mike Frame and Ms. Peggy Gravitz

REPORTS FROM DISA/JIEO

0910 - 0940 DoD Repository: Mr. Peter Pasek

0940 - 1010 Data Quality and Security: Ms. Miranda Stern

1010 - 1030 Break

1030 - 1100 Global Command and Control System (GCCS) Data Needs: Ms. Angela Booker



### 3.2 ATTENDEE LIST

#### DRIWGW GENERAL MEETINGS TUESDAY - WEDNESDAY, FEBRUARY 7-8, 1995

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### 3.2 FEBRUARY 7-8, 1995 ATTENDEE LIST (Cont'd.)

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### 3.3 UPDATE ON DMSO HAPPENINGS

#### **COL Jerry Wiedewitsch, Deputy Director of DMSO: DoD Modeling and Simulation: Putting the Warfighter in the Loop**

COL Wiedewitsch began by welcoming everyone to the 9th DRTWG meeting. He stressed that DMSO would like to bring modeling and simulation into the C4I world as a service. The vision is that "defense modeling and simulation will provide readily available, operationally valid environments for use by DoD components to train jointly, develop doctrine and tactics, formulate operational plans, and assess war fighting situations as well as to support technology assessment, system upgrade, prototype and full scale development and force structuring. Furthermore, common use of these environments will promote a closer interaction between the operations and acquisition communities in carrying out their respective responsibilities. To allow maximum utility and flexibility, these modeling and simulation environments will be constructed from affordable, reusable components interoperating through an open systems architecture."

He went over the new DMSO organization: CAPT Jim Hollenbach is the DMSO Director, COL Jerry Wiedewitsch is the Deputy Director, Mr. Gary Yerace is the Chief of Staff and in charge of office administration and management. There are four divisions: The Science and Technology Division is lacking a chief scientist but CDR Gary Misch is the acting head, the Technology Application Division is headed by CDR Gary Misch, the Operations Division is headed by LtCol Dave Bartlett, and the Business/Financial Management Division is headed by Mr. Waverly Debraux. The chart indicated where the various DRTWG activities fall (mainly in the Science and Technology and Technology Application Divisions).

He discussed the DoD M&S management structure showing Under Secretary of Defense (Acquisition & Technology) (USD(A&T)) at the top, Director Defense Research & Engineering (DDR&E) and the Executive Council for Modeling and Simulations (EXCIMS) in the middle, and DMSO and the Modeling and Simulation Working Group (MSWG) at the bottom level, including DoD Component representatives. Off the lower level comes the Functional Work Groups, the Technology Work Groups and the Task Forces. The Technology Work Groups have been changed to reflect the Defense Master Plan. They are: Architecture, Data and Repositories, Environmental, Systems/VVA, and Human Behavior. The name of the I/DBTWG has been changed to the DRTWG to better describe its role with respect to the Defense M&S Master Plan and the other TWGs. Activities will continue much as before but with Master Plan focus and more interaction with the other TWGs. He then showed an integrated M&S Data Administration infrastructure which detailed where the M&S FAd is with respect to DDR&E, the M&S Integrated Process Teams, the DRTWG and its Task Forces and Subgroups, and the Component M&S offices.

Many things are happening: The DoD M&S Master Plan is in coordination; an Architecture Management Group (to operate in an open forum much like the Internet) has been established; an ARPA/DISA Advanced Information Technology Services JPO has been established (to manage DSI and C4I initiatives, including Leading Edge Environment for Global Command and Control (LEEGCCS), Advanced Joint Planning (AJP), Advanced Concept Technology Demonstration (ACTD), and the Joint Warrior Interoperability Demonstration (JWID). DMSO is participating in Synthetic Theater of War (STOW) 97 activities and in the development of a new generation of simulations, Joint Simulations (JSIMS). COL Wiedewitsch went through the six objectives of the DoD M&S Master Plan showing data as part of five of the objectives. Data is getting attention, funding, and is very important to the success of the master plan.

DoD modeling and simulation is looked at as the base for supporting the four pillars of military capability: force structure, modernization, readiness, and sustainability. The strategy presented to the DSB is to jointly establish a communication framework (through an open forum much like

the Internet), a high level architecture, data standards and a repository of reusable elements. An operational concept shows the C4I System Logical Networks interacting with the M&S Logical Networks, for example to enable a simulation to use a plan from an operational system and feedback results to the operational users. This would enable the use of M&S in developing operational plans, training, mission rehearsals, and battle and would make real world data (e.g., intelligence, weather, imagery) available to M&S. DMSO needs to define environmental, systems and behavioral authoritative representations and establish executive agents for these (DMA was recently established as the executive agent for terrain). A corporate DoD process for VV&A is being developed. There are plans to use fielded C2I systems in M&S exercises and thus a need for the Components to work closer with the DIS steering committee.

COL Wiedewitsch went over the USACOM STOW 97 and beyond requirements to develop a joint, entity level, object-based simulation system for Joint Task Force (JTF) crisis rehearsals and exercises using higher quality simulation, lower overhead, and object code reuse. The most interesting requirement with respect to the DRTWG is the requirement to do fast database builds -- 96 hours in a crisis. (An action item: Iris Kameny will be gathering a small group to begin to address this requirement). STOW 97 will require technologies for: synthetic forces, synthetic environments, information and networking technology and advanced simulation technology (MMI, database management, synchronization, and after action reviews).

Synthetic Theater of War-Europe (STOW-E) was conducted Nov. 4-7, 1994 as part of ATLANTIC RESOLVE 94 (formerly REFORGER). It linked Army, Navy and Air Force units in each service's virtual, live and constructive simulations via the DSI. An example of success was that a brigade commander fought all his live, virtual and constructive brigades as live with the effects of simulated F16s and Apache's appearing to be real. The Leading Edge Environment (LEE) for the Global Command and Control System (GCCS) is being worked within the Advanced Information Technology Services (AITS) ARPA/DISA JPO with DMSO playing a part because M&S will be used as applications in LEEGCCS. The objective is to demonstrate ARPA technology in an ACTD of fieldable prototypes (tools, environment, applications) that will be used to evolve GCCS through eventual incorporation of LEE products into the GCCS core.

Joint Simulations (JSIMS) will define a system architecture, services, development standards, and validation standards to ensure distributed-developed software is interoperable. The JSIMS concept is for the services to leverage ARPA advanced technology in developing software to meet service-unique requirements in accord with the evolving JSIMS requirements and standards. An objective is to develop joint and common objects that can be interoperable and reused. JSIMS will form the technical standards and requirements umbrella under which the services will build their advanced simulations: WARSIM (Army), NASM (Air Force), and NSS (Navy). The M&S Master Plan technical framework forms a larger umbrella over mission space domains that encompasses engineering, manufacturing, etc.--much more than the warfighting battlespace.

#### **Dr. Chien Huo: DoD M&S Master Plan Update Modeling and Data Administration Program**

Dr. Huo summarized important recent DMSO events: (1) Master Plan draft is out with vision, objectives, actions, schedule and responsibilities; (2) the focused call process has stopped; (3) DMSO investments will focus on execution of the Master Plan; and (4) the 10th DRTWG Conference will be held August 1-4, 1995 at IDA. There was a question about what it meant to stop the focused call to Components for proposals. The answer was that the Components have representatives on the MSWG and the EXCIMS and can make their needs known in those groups to influence the way DMSO funds are allocated to carry out the Master Plan.

Dr. Huo announced that the DIS Steering Committee has approved the formation of a DIS Data and Repositories Special Interest Group (SIG) which will meet for the first time during the DIS

Workshop in Orlando, March 13-17. The co-chairs of the SIG are Dr. Huo and MAJ Walt Swindell (USA/TRAC). Also in the previous week, Dr. Huo led a DoD C3I Stakeholders Strategic Planning meeting addressing data administration needs and that went very well. He sees a strong need for the C3I community and the M&S community (as well as the intelligence community) to work together on data administration and standards. He said that in implementing the Corporate Information Management plans there has been a strong disconnect between the operational world and the technologists. The operators don't know what technology has to offer.

Dr. Huo's vision, as the M&S FDAd, is to "enable data suppliers to provide the M&S community cost-effective, timely, and certified data to promote reuse and sharing of data, and to provide interoperability of models and simulations, and improved credibility of modeling and simulation results." His view is that process modeling for requirements definition and traceability will become the primary means of communication between users and developers. It will be the cornerstone of acquisition documentation, and be needed to recognize a common technical framework for C4I and M&S.

The DRTWG was organized to respond to the real world challenges of data that is non-standard and redundant, has no recognized responsible authoritative source, and is lacking in data security policy and technology required to support data reuse and sharing. Furthermore, data collection and dissemination is labor-intensive and costly and is missing verification and validity checks and documentation of such. The main needs of the M&S community are for: (1) a repository system that can manage all M&S information products (e.g., metadata/data standards; data and databases; reusable algorithms and models and simulations; and common tools); (2) common standards for complex data, nomenclature and symbology; (3) data verification, validation and certification; and (4) data security.

The M&S Master Plan and supporting Investment Plan are guiding DMSO's short-term and long-term initiatives. Master Plan draft comments received from OSD, CINCs, Services, industry and individuals identified data as a critical problem that was not given enough emphasis. This resulted in data standards being brought forward as a part of Objective #1. The M&S Master Plan establishes specific milestones for (1) data standardization; (2) data VV&C in coordination with M&S VV&A; (3) developing a distributed MSRR; (4) establishing authoritative data sources; and (5) defining data security requirements.

The main DMSO DA activities are: (1) FDAd DA plans and activities; (2) developing the M&S Community Directories (to databases, models and simulations, and authoritative data sources); (3) DRTWG semi-annual meetings; (4) Task Forces for Data VV&C, Data Standards, Data Security Requirements and Repositories and several Subgroups (Data VV&C Guidelines, Authoritative Data Sources, Complex Data).

The mission of the M&S data administration program is to first: establish, promulgate, and oversee policies, procedures, and methodologies for functional data requirements, data standards, data quality (data verification, validation and certification) and data security. These will form the general guidance for use of data in environmental, systems, and human behavior common representations for M&S. Secondly, to develop a distributed repository system to serve M&S clients in developing and using M&S and accessing and retrieving data at multiple security levels. The M&S Resource Repository (MSRR) project will define a distributed MSRR minimal architecture compliant with the DISA Technical Architecture Framework for Information Management (TAFIM) and industry standards. M&S community organizations needing to develop a new data center, database, reuse repository, etc. will be encouraged to make their repository compliant with the MSRR minimal architecture to encourage greater interoperability and sharing of service and application code and tools.

**Ms. Linda Calvert: Status of Data Standardization**

To carry out DA activities, the M&S FDAd has established a support group at DMSO in Washington that is currently led by Ms. Linda Calvert and a group at Ft Huachuca led by the JDBe project manager, Ms. Janet McDonald. The Washington DA organization will be coordinating with Component M&S offices to provide DA support to the M&S community.

The kinds of activities the DA organizations provide to the FDAd are: (1) representing him at his request on functional issues affecting M&S; (2) providing input to him on functional area issues; (4) working towards streamlining the 8320 data standardization process; (4) planning and budgeting DA resources; (5) aiding in preparing and submitting the M&S Data Administration Strategic Plan (DASP) to DoD; (6) aiding in the development of M&S Master Plan inputs; and (7) aiding in the development of M&S DA policy and procedures.

Operational services provided by both the DMSO and JDBe teams include: (1) assisting in prioritizing M&S DA efforts and in conducting functional and technical reviews of M&S and DoD data standards proposal packages and process and data models; (2) providing training to the M&S community; (3) participating in functional process improvement; (4) assessing the M&S DA program; and (5) facilitating information exchange (e.g., through the DRTWG portion of the M&S Information System and its implementation on WWW).

Technical activities include: (1) assisting in developing M&S process and data models and M&S model integration; (2) participating in DoD collaborative data modeling efforts to extend the DoD Data Model; (3) identifying unique M&S data requirements (e.g., complex data, reengineering of data); (4) technically contributing to DRTWG Task Forces and Subgroups in relevant areas of expertise; (5) participating in relevant standard and other technical committees and organizations to further M&S data related goals; and (6) participating, at DMSO's request, in furnishing data expertise to relevant M&S activities such as STOW 97, LEEGCCS, JSIMS.

Near-term DA products include a strawman "to be" support for 8320 data standardization process in the M&S community; an M&S DA Policy Instructions and DA Procedures Manual and the M&S DASP.

JDBe standardization efforts include:

- Development and testing of the JDBe M&S Methodology for producing data models
- Submitting candidate standard data elements to M&S FDAd based on data models
- Development of formal training course and training of over 100 M&S people
- Publication of JDBe Methodology Manual
- Development of Subject Area Information (SAI) model for electromagnetics
- Support for M&S FDAD in reviewing over 40 DoD proposal packages
- Establishment of Interim MSRR
- Support for M&S client projects, including CENTCOM, UTSS, and BFTT

Based on the Master Plan, DoD Directives, and priority projects such as STOW-97, the preliminary priorities for developing data standards are for C3I data and environmental representation data.

Summary:

1. M&S FDAd and support organizations are in place and operational
2. M&S DA Policy and Procedures (Draft) will be released in FY95
3. M&S data model proposal packages are in pipeline and will be submitted to DoD DA over next 12 months in accord with M&S Master Plan schedule
4. M&S DA Standards Task Force will coordinate data standardization efforts across M&S community

## **Discussion:**

Ms. Calvert said that they need help from the M&S organizations in prioritizing the M&S DA efforts. Component approval of the Master Plan is expected in fall of 1995. Ms. Lana McGlynn offered the Army's tool for tracking data element standards development and submission of proposal packages. It is already on the agenda for the MSRR project to look at the Army tools as part of tool selection. Someone else in the audience said that they didn't have a tool that would allow them to review the data standards packages; JDBE responded saying such a tool is available through their WWW page.

Some JDBE experience: (1) historical experience in simulating electromagnetic environments; (2) have reversed engineered about 6 target simulation systems for the UTSS project; and (3) have provided training to BFTT.

Gary Lambert (JDBE) said that 50% of the entities they needed for CENTCOM were in the DDRS and could be reused. However, 95% of entities and attributes in the DDRS are in the developmental state. It is hard to use the DDRS because it lacks a taxonomy. It is hard to find things to reuse and hard to determine which are duplicates or differ slightly.

Someone from DIA said they were uncomfortable submitting data elements into an unclassified repository and so won't be doing so. However, other people in the audience said that they will be submitting DIA data elements along with the rest of their data elements.

## **Mr. Paul Foley: Perspectives on Environmental Data**

Mr. Foley represented the DMSO Environmental Representation Technology Working Group (ERTWG). He used an overview chart to show us all the environmental data project activities and standardization activities that they need to coordinate with. These are listed below.

### **Environmental data project activities:**

- Joint Warfare Simulation Object Library (JWSOL)
- Joint Task Force-Advanced Technology Demonstration (JTF-ATD)
- Dynamic Environmental Effects Model (DEEM) (Argonne Labs)
- Environmental Effects in Distributed Interactive Simulation (E2DIS)
- Master Environmental Library (MEL) (kickoff is next week)

### **Standardization Activities:**

- IEEE/DIS process (Environmental WG (land, sea and atmosphere) and PDUs)
- Federal Geographic Data Committee (FGDC)
  - Spatial Data Transfer Standards (FIPS 173)
  - Content Standards for Digital Spatial Metadata
- Defense Standardization Program MCGT area
- Digital Geographic Information Working Group (DGIWG)
- Tri-Service CAD/GIS Working Group

The ERTWG goal is to get most environmental executive agents in place by May, 1995. So far, DMA has been designated the executive agent for terrain.

JWSOL has had DMSO funding and now is supported by ARPA. Charles Herring has been a central person on the project. He will be coming to DMSO and they expect him to introduce some commonality across the DMSO environmental projects.

Mr. Foley went through the Argonne Lab project taxonomies. First, he addressed the Object Management Working Group Environmental Taxonomy which is quite detailed but at the macro level. He then went through their DEEM object schema (micro combatant level). DEEM has

taken some categories and broken them into subsets (e.g., surface cover) for rendering algorithms to show environmental effects.

He believes that they need for DoD to describe the data elements in the environmental area (which is what DoD has attempted to do with the DMA collaborative data modeling effort but have found it is very expensive and time consuming). He also said that the DIA MIIDS database is being replaced by the MIDB and that needs to be based on a data model. (The DIA people in the audience were not able to confirm or deny that the MIDB will be based on a data model.)

He thought that solving the data model differences will be easy but that if applications do not code the environment consistently, then there will still be a problem in exchanging environmental data.

Mr. Foley said that currently there is no central location for all the different environmental data dictionaries and he listed eight of these. The Feature and Attribute Coding Catalog (FACC) was developed by an international committee under DIGEST. It is a dynamic catalog, DMA is using it as well as other organizations and it may form a base standard. Dave Danko explained that the Feature and Attribute Coding System (FACS) is an internal DMA schema for internal digital system use and has been used by Project 2851 as a basis for a Combined Terrain Information System (CTIS). The DMA Feature File (DMAFF) is an older DMA scheme and there needs to be mapping developed from that to FACC. The Digital Line Graph-Enhanced (DLG-E) is feature based and differs from the earlier line based scheme but there are differences between it and FACC. Other data dictionary schemes include Binary Universal Format for the Representation of meteorological data (BUFR), TRI-Service CAD/GIS Standard, and Topologically Integrated Geographic Encoding and Referencing (TIGER) (Census Bureau). In DoD, there are also many project unique type/status coding structures.

Mr. Foley also discussed DoD Policy Memo 95-1 that establishes the requirement for waivers to use MIL-STDS/SPECS in contract solicitation. As a result, DMA as manager for the MCGT, is converting all MIL-STDS to interface standards and MIL-SPECS to performance specifications.

#### **Dr. Randy Garrett: STOW-97 Briefing**

Dr. Garrett supports COL Bob Reddy in the ARPA Advanced Distributed Simulation Program. STOW-97 is the largest one of ten ADS programs. ADS features are virtual simulations, entity-based (dealing with weapons and system platforms), 3-D based (using 3-D terrain) and inherently distributed. Reasons for the STOW program are (1) wide variety of changing threats from mid-intensity to operations other than war; (2) increased focus on maneuver, synchronization, agility and C2; (3) importance of joint and combined warfare; (4) the requirement for a high state of readiness; and (5) a reduction in defense resources. Current simulations don't meet DoD current needs. They focus on smaller scale operations. Additionally, technology today can support STOW whereas it couldn't have ten years ago.

The program goals are to: (1) improve the quality of simulations beyond current state-of-the-art (entity resolution and performance, and environmental representations); (2) improve simulation training effectiveness and flexibility (by interfacing M&S with operational C4I); (3) reduce overhead costs of simulation (knowledge-based SAFORS, faster database builds, improved information transfer); (4) improve after action analytical tools; and (5) achieve simulation driven mission rehearsal IOC.

The STOW Concept of Operations is that as STOW-97 simulations are demonstrated, they can actually reside at ACOM and live there for two years during which they will be used operationally. There will be engineering demonstrations in the fall of each year to get to STOW-97, the first was STOW-E in November 1994. STOW-97 will address USACOM rehearsal challenges. At the top of the list is operational crisis planning resulting in rehearsals and operational C4I. There is a strong linkage between STOW data and STOW technology



development. STOW is emphasizing object libraries not particularly for reuse but for determining interoperability. The concept is that objects will register their attributes and the library will also contain algorithms that calculate object to object interactions. They would like to move closer to the CORBA concept of an object broker. STOW simulation performance requires algorithms and data at multiple resolution levels. STOW will be focusing more on the individual soldier level, new systems such as logistics and intelligence, and linkage to real world data sources such as weather, intel, and log data.

The areas that need emphasis are: dictionaries of objects and object attributes (including algorithms for environmental interactions and behavioral descriptors for OPFOR and individuals); environmental representation data (to support terrain reasoning, sensor interactions, computational/network load tradeoffs); intelligence-oriented data for entities; and real world data (sources, formats, links) in areas such as transportation and logistics.

### 3.4 REPORT FROM INTELLIGENCE FDAD

#### **Mr. Jim Davidson: Data Standardization to Achieve Interoperability**

The issue: DoD has efforts underway to model and standardize data to meet interoperability objectives and support the warfighter which if they were realized would improve joint interoperability at reduced cost and risk. But: no single data standard reflects the data needs across the C3I community; data standardization is a lengthy process; all DoD systems cannot be modified in the near-term to support a single standard because of cost; and inadequate training exists for use of evolving data standards and support tools. An opportunity exists to influence data standardization through the migration system process.

Convergence is not occurring rapidly: MIIDS IDB/MIDB is an intel standard but not supportive of tactical ground operations and equipment and personnel operating parameters are not consistent with the C2 Core Model; the DISA/JIEO C2 Core Model lacks intel-unique elements and not all data elements have been fully standardized. On the other hand he pointed out that USMTF data elements are a joint-level standard supporting tactical operations, the data elements can be used outside of messages, and they support many legacy as well as migration systems; and Variable Message Formats are planned for use by Army tactical systems using Army tactical communications. [NOTE FROM IRIS, THOUGH DAVIDSON IS IMPRESSED WITH THE MESSAGE SYSTEMS, THERE ARE MANY INHERENT PROBLEMS WITH THEM (I DID A USMTF STUDY LAST YEAR SO FEEL FREE TO ASK ME ABOUT THE PROBLEMS). FOR ONE THING, THE DATA ELEMENTS ARE NOT BASED ON A DATA MODEL AND ARE NOT STANDARD THUS REQUIRING MUCH TRANSLATION TO MESSAGES FROM DATABASES AND VICE VERSA. THE USMTFS UNDERGO 300-500 CHANGES PER YEAR, REQUIRING OVER 2 YEARS TO GET NEW CHANGES INTO THE SYSTEM BECAUSE SOFTWARE CHANGES TO TRANSLATORS ARE REQUIRED WHICH IN TURN REQUIRES REACCREDITATION OF SYSTEMS.]

Today some interoperability exists within groups of systems with a common domain via direct data sharing and standard messages and between system domains via standard messages. The final solution of a single data standard used within and between all systems is infeasible because of the large number of disparate DoD systems. The recommended strategy is to identify and prioritize systems requiring enhanced interoperability and evolve high priority systems to coordinated data standards more quickly facilitated by reusable software, translator technology, database warehousing concept and schema brokering. He recommends ensuring sufficient resources are applied to the C2 Core Model and MIDB definitions to achieve consistency and then mandate this data standard for all migration system efforts. His recommendations included boosting training programs.

Mr. Davidson was also concerned (as we have been) with putting legacy data elements into the DDRS without them having been data modeled. He said that about 20% of unmodeled intel DEs have been entered this way. They also have problems entering data elements into an unclassified DDRS and will be developing a classified version that will be a superset of the unclassified DDRS. He hopes to have this accomplished by summer 1995. The briefing he gave to us has been given to Mr. Paige.

### 3.5 REPORTS FROM DRTWG TASK FORCES AND SUBGROUPS

#### **Mr. Bob Hartling and Mr. Mark Ralston: Data VV&C Guidelines Subgroup Report**

Mr. Bob Hartling briefly discussed related, concurrent efforts that are being coordinated with this Subgroup effort. They are: the DMSO Distributed Simulation VV&A Study (led by Ms. Pam Blechinger), the DIS Workshop VV&A WG led by Ms. Simone Youngblood, and the MORS SIMDATAM Workshop which will take place March 28-29th and will have a WG on VV&C in Databases.

Mr. Jeff Rothenberg (RAND) is contributing to the VV&C effort by defining a database/dataset quality profile that may include metadata about the data at the database, data-element and data value levels as well as providing an audit trail of data derivation. It will serve both user and supplier/producer data.

The focus of the VV&C Subgroup is on development of VV&C process guidelines that will eventually lead to a DoDI. DMSO is funding this FY95 effort that is being led by Mr. Mark Ralston (USA/AMSAA) to produce initial draft guidelines that are useful and practical by the end of the year. These will be followed by an improved version the following March and pilot studies in 1996. Three tasks have been laid out that include IDEF0 process modeling of Components' representative V&V processes. Task 1, Guidelines for Non-DIS User Data VV&C, is being led by Lt Col Denny Lester with participation from five organizations (Army, Navy, Air Force, JS, and OSD). Task 2, Guidelines for DIS User Data VV&C, will use the results of the DIS VV&A/C effort led by Ms. Simone Youngblood with data VV&C being addressed by Ms. Susan Solick with aid from Mr. Jeff Rothenberg. Task 3, Develop Guidelines for Producer Data VV&C, is being led by Mr. Mark Ralston with five participating organizations (Army, Navy, Air Force, DMA and DIA).

The audience raised a question about the need for cost data. For example, DIS has shown that for a 10% investment one can get good M&S VV&A. Mr. Ralston agreed to try to collect cost data and insights while carrying out Task 3.

#### **Mr. Mike Hopkins: Authoritative Data Sources Subgroup**

The Authoritative Data Sources (ADS) Subgroup was started a year ago to (1) identify ADS and develop an ADS directory and (2) address the relationship between data sources, data centers and M&S data users. Last April the ADS Subgroup produced a draft paper, containing some initial data sources, as a first attempt to determine and describe the magnitude of the task. Currently, they have been concentrating on (1) developing a taxonomy for identifying ADS and for accessing the ADS directory, (2) defining their terms, (3) developing the ADS directory data model (which is to be integrated with the Database and M&S data model) and (4) addressing how to populate the ADS. Future plans are to (1) finalize the taxonomy and use it; (2) finalize the definitions; (3) develop an approach for surveying the community to identify ADSs; (4) finalize the ADS document that describes responsibilities and roles of ADSs, data centers and users, and includes guidelines; and (5) define to the Data Security Requirements Task Force how data centers exchange data with other centers and release data to users (data aggregation and release issues).

Tasks with FY95 DMSO support for the Subgroup and CENTCOM are to: (1) identify ADSs (includes developing data survey, taxonomy and collection); (2) develop ADS directory and support it via the Interim MSRR WWW interface; (3) develop an exportable/reusable data quality engineering tool based on CENTCOM's current tool (supported by DMSO); and (4) integrate the CENTCOM databases data model with the C2 Core Data Model.

The ADS is available in raw form via the Interim MSRR WWW at JDBE; a word perfect copy is also available. The Defense Manpower Data Center has told the Subgroup that they may use the DMDC catalog. An issue is whether catalogs should be duplicated on the ADS or the ADS should furnish pointers to existing catalogs. The latter is probably preferable since the maintenance of the catalogs is then assumed by the owners and not by the M&S community.

**Ms. Iris Kameny (for Ms. Lunt and Dr. Huo): Data Security Requirements Task Force Report**

This is the newest Task Force. It held its first meeting on December 14, 1994 attracting over 50 attendees from industry, government and FFRDCs. The objectives of the task force are to (1) provide a forum for identification and discussion of M&S data security issues and (2) to organize, analyze and translate M&S data security issues into requirements during FY96. Data security policy requirements will be presented to the DMSO Director to work upwards through DoD. Data security technology requirements will be addressed by the ARPA/CSTO Information Security Program led by Ms. Teresa Lunt. The ARPA objectives in participating in this TF are (1) to use the forum to match up database security technology players with M&S players and (2) to use M&S data security requirements to plan testbed projects involving M&S users having problems and experimental database security technology as possible solutions.

Ms. Kameny collected initial M&S data security issues, documented them in a white paper and briefed them at the December 14th meeting. They covered: data exchange and access; data aggregation; classification of enumerated values; protection of data source in downgrading data; releasability of data/information; standardized security labels; multilevel secure DIS exercises; and a DIS component participating in exercises at different security levels. A policy related issue is the trade-off between protecting data and the need to interoperate and share data among DoD organizations. This is becoming an important issue as connectivity and interoperability needs increase.

Mr. Terry Mayfield (IDA) will be Ms. Lunt's POC for this TF and Ms. Iris Kameny will be Dr. Huo's POC for this TF.

**Mr. Jim Augins and Mr. Pete Valentine: Repositories Task Force**

The objectives of the Repositories Task Force are to: (1) define a minimal common architecture for M&S community repositories for managing data standards and metadata, data, models and simulations, algorithms, and common tools; (2) identify requirements and solutions for M&S repositories; (3) investigate the applicability of DoD, Component and industry ideas, COTS and GOTS solutions; (4) and provide a forum for review of progress and related activities of the M&S repository community.

The Sub-objective 5-3 of the M&S Master Plan is to provide a repository system to facilitate developer and end-user access to M&S resources. "DoD must establish a distributed system of M&S Resource Repositories (MSRRs) to efficiently and effectively provide the community with timely, verified, and validated data, metadata, algorithms, models, simulations and tools. The MSRRs should also provide background information (e.g., model assumptions, source of data, classification of data, range of validity of algorithms, VV&A/C history). This will promote reuse and sharing of M&S resources and will improve credibility of M&S results. These repositories will provide tools for configuration management and for accessing, browsing, and retrieving M&S resources."

The Master Plan actions are to develop an Interim MSRR in FY95; complete MSRR requirements by 2Q96; complete prototype MSRR by 2Q97; provide limited operational testbed by 2Q98; initiate DoD-wide distribution in FY99 and complete the distribution in 2000. There are also actions to develop authoritative data sources and implement the initial ADS directory as part of the Interim MSRR in FY95, and to develop prototype configuration management tools by 2Q97 and included them in the limited operational testbed by 2Q98.

To carry out these activities, the Repositories TF met during August, October and December to specify an MSRR Project that encompasses the following tasks:

- Task 1: MSRR Framework and Concept: CONOPS, process and data models
- Task 2: MSRR Functional Requirements and Specifications, including: MSRR configuration management requirements, architectural and network requirements
- Task 3: MSRR Design Studies and Tradeoffs: top level design and tradeoffs
- Task 4: Interim MSRR: information exchange based on WWW standards and interim support for M&S FDAd
- Task 5: Support to DRTWG

Work in progress includes: (1) MSRR road map; (2) identification of MSRR prototype object set; (3) draft meta model to support the 8320 process for submission of data elements; (4) identification of TF security concerns; (5) addressing MSRR WWW information exchange architecture and standards; and (6) coordinating with DISA on their new repository effort.

FY95 objectives are to: (1) develop MSRR framework and concepts; (2) write MSRR functional and architecture requirements document; (3) write MSRR top level design document; and (4) write a WWW standards manual for information exchange.

Current status: the Interim MSRR is operational and supported by JDBe at Ft. Huachuca. It includes access to the initial raw form of the ADS directory information.

#### **Mr. Peter Valentine and Mr. Jim Augins: WWW Implementation Plans**

The Interim MSRR can contain directories/catalogs; metadata; instance databases; algorithms; M&S and tools. The Interim MSRR WWW architecture will be distributed, modular, client/server, low cost and will operate in heterogeneous environments (all major platforms: UNIX/POSIX, DOS/WINDOW, Mac System 7 and servers to include Windows/NT). When a WWW client wants to communicate with a WWW server, it sends a request to the server in the form of a URL (Universal Resource Locator) which identifies which "Page" on the server it would like to retrieve. The server in turn passes the contents of the file referenced by the URL to the client. Usually these files are HTML (Hyper Text Markup Language) "Pages." HTML is a subset of the government standard SGML (Standard Generalized Markup Language). HTML documents can be created with a simple text editor, or with a number of shareware or commercial tools. HTML documents can contain formatted text, in-line graphics, sound, multi-media and links to other WWW Pages or resources. URLs can point to other resources such as: Gopher servers, E-Mail addresses, WAIS gateways, or data files via FTP or HTTP. Other services the MSRR will provide are: WAIS catalogs, E-Mail, Gopher, FTP, NewsGroups, Internet Relay Chat (IRC)/MUD-Object Oriented (MOO), video conferences and Groupware.

The first Interim MSRR node is at: <http://huchuca-jdbe.army.mil/>  
Related NRaD node: <http://netmon2.nosc.mil/reposwg/jimswg.html>  
The DMSO gopher M&S Information System: <gopher://gopher.dmsomil:70/>  
The TWISTIAC: [http://www.tiig.ist.ucf.edu/ms\\_web/ms\\_web.html](http://www.tiig.ist.ucf.edu/ms_web/ms_web.html).

During FY95, there are plans to bring additional Interim MSRR nodes up at USA/TRAC, NRaD/ARMS, CENTCOM, and JWFC.

#### **Ms. Linda Calvert and MAJ Walt Swindell: Data Standards Task Force**

The Data Standards Task Force started up in February 1994 as a result of the MORS SIMDATAM recommendation for such a group but it has not been very active. Rather its two Subgroups, Repositories (which has now become a Task Force) and DIS Data Standards, have been active. The M&S FDAd has decided to make the Complex Data TF a Subgroup under the Data Standards TF and to reconvene the Data Standards TF to address a new agenda. Ms. Linda

Calvert is working on a charter for the Data Standards TF and will identify priorities for a proposed agenda that includes: reviewing M&S DA Policy and Procedures; refining the 8320 data standardization process for M&S; defining complex data; modeling of complex data; and use of modeling tools. The first meeting for this revitalized TF is planned for April 1995.

The outcome of the DIS Subgroup was a collaborative paper "DIS Need for DoD Data Standards" (authored by Iris Kameny, Walt Swindell, Luci Haddad, Peter Valentine and Jim Watson) which was presented at the 11th DIS Workshop on Standards for the Interoperability of Defense Simulations, 26-30 September 1994 to the working groups on Fidelity, Management and Usability; VV&A; Fidelity Descriptions Requiring Logistics; and Computer Generated Forces. The paper covered: evolution of data standards; DIS vision and its void wrt use of data standards; ways data standards can benefit DIS; the data standardization process; DIS data modeling; future vision of DIS with data standards, and DIS roadmap to data standardization. The roadmap to DIS data standardization included: education; process modeling of DIS CONOPS; guidelines for performing standardization; cataloging and prioritizing data requirements by functional areas; implementing data standards in that order; and developing configuration management for maintenance.

A recommendation was to form a DIS Data and Repositories SIG with the objective to make recommendations to the DIS community on requirements for, and use of, DoD data standards and repositories. It would: define DIS functional area requirements for data standards to be compliant with DoD data standards and relevant commercial standards; define or identify common datasets (authoritative data sources) for use in DIS exercises; and define DIS requirements for DIS MSRRs compliant with the developing MSRR architecture.

The Data and Repositories SIG proposal was accepted by DIS and the first meeting will be held during the 12th DIS Workshop March 13-17, 1995. The DIS Data and Repositories co-chairs are MAJ Walt Swindell and Dr. Chien Huo.

### 3.6 REPORTS FROM DMSO FUNDED PROJECTS

#### **Mr. Robert Helsel: Modeling and Simulation Information Management (MSIM)**

M&S data goals are to provide data interoperability, consistency and sufficiency within and across functional areas; maximize use of operational data for instance fill; and maximize software reuse. In reality current models are function and system specific, stovepipes exist within functional areas, there is minimal data interoperability within and across functional areas and there is inconsistent use of operational data. The MSIM objectives are to: improve M&S of real world operations, eliminate redundant data production, and furnish proof of concept in the C3I electronic warfare area. Where electronic warfare is defined as: any military action involving the use of electromagnetics and directed energy to control the EM spectrum or attack the enemy. It includes electronic attack (EA), electronic warfare support (ES), and electronic warfare protection (EP).

The MSIM tasks are:

- 94-1: EW data standards working meeting: held in October 1994
- 94-2: Survey of Service C2W/TW M&S Requirements: NRaD, AMSAA and AF S&A
- 94-3: Report: M&S Data Support Deficiencies: service reports under development (1 March)
- 94-4: Report: M&S Data Elements (metadata): service reports being integrated (15 February)
- 94-5: Draft Data Standardization Process Architecture: in review (final 1 March)
- 94-6: Draft Joint EW M&S Data Set(s): due 1 April 1995

Tasks 94-2,3,4: identified data requirements for the Campaign Level using 8 models: Army: VIC, JANUS, CASFORUM; Navy: ITEM, CWM; Air Force: Thunder, Air Warfare Simulation; and Joint: JACUZI (feeder into AF Warfare model). They identified 450 data elements.

They are using NWTDB reverse engineering tools and were questioned about why they didn't use JDBE. JDBE has trained some of the NWTDB people and they have developed their own reverse engineering techniques. They have found that M&S have data elements such as for performance that are not found in operational systems (e.g., simulation entities, stoptime, etc.). Some things are special to each of the three worlds they have been looking at (M&S, operations and acquisition). It is difficult to make matches or relationships between the data elements in the operational world and those used in M&S.

Task 94-5: C3I interoperability: they are preparing data element standardization for DDRS registration and are running into the CDAd vs FDAd paradigm where there is a NWTDB functional view through the Navy DA and a DMSO view through the M&S FDAd. He showed a modeling hierarchy where the DoD C2 Core Model (with C3I extensions) is a functional area model above the NWTDB logical data model (which they are using as proof of concept) to functional database models (NWTDB NID, and RAPADS segments for electronic warfare), down to physical models (service campaign models). They have developed a process architecture for data standardization and an M&S data element decomposition flow to handle complex data (derived data and composite data). [A QUESTION COMES TO MIND WRT COMPLEX DATA AND HOW THEY ARE HANDLING THE DERIVED DATA ELEMENTS IF THAT IS WHAT NEEDS TO BE SHARED AND REUSED. GOING DOWN TO THE DERIVATION LEVEL IS NECESSARY FOR UNDERSTANDING THE DERIVATION BUT ONE STILL NEEDS A STANDARD FOR THE COMPLEX DATA ELEMENT, ELSE IN DATA EXCHANGE, ONE WOULD HAVE TO SEND ALL THE ATOMIC DATA NEEDED FOR THE RECEIVER TO DERIVE THE COMPLEX DATA VALUE.]

Task 94-6: draft EW Data Set Methodology: involves data normalization, metadata, DE harmonization (cross model concurrence), DE comparison with operational DEs, and DE standardization for DDRS submission.

**Mr. Mike Hopkins: Data Quality Engineering Tool Project**

The CENTCOM DQE process applies the data element dictionary constraints and rules specified by the Database Administrator (DBA) against the instance data, tagging errors and sending formal data trouble reports back to the data providers in a file format the providers are familiar with. The system is designed to be used by any organization's DBA desiring to check data in a UNIX environment using an INGRES DBMS. The fixed length source files can be unlimited in number, format, and content. DQE is a system with six major functional areas: (1) Data Element Dictionary; (2) Source File Processor; (3) Data Quality Validation; (4) Data Trouble Reports (DTR); (5) Query/Rule Builder; and (6) system maintenance functions.

DQE functionality will produce better data by: providing problem reporting process, improving database VV&A checks, enhancing data administration, tracking data element sources and models, and providing an architecture to standardize data descriptions and data elements. DQE provides an automated process of applying business rules to identify data problems on incoming data by: automated comparisons, rules (operational, technical and procedural), math computations, acceptable range and domain checks, missing data, duplicate keys, military dependency tests, and statistical tests. An interactive editor guides the user through the DQE processes and the rules editor interactively allows the user to create or update rules (using SQL statements), verify that the rule elements are valid, verify SQL syntax, and spell check the rule. The data trouble report processor does error display and validation and views or prints the data trouble reports as well as tracking them.

The portable tool will be completed by September 1995.

**Mr. Jim Santangelo: Universal Threat System for Simulators**

The UTSS Repository will be a Sun/Database server that will have inputs from intel source data, blue source data, simulation software, descriptions of source databases and simulations, and standards. Its products include threat data, catalogs (data and software distributed via WWW and floppy disc), standards and simulation software. Its customers are simulators, developers, trainer procurements, DIS users (e.g., STOW), and other M&S users. The UTSS Repository will be accessed via user workstations on a LAN via a GUI and import and export software. Repository tools include GUI tools, filter programs and unclassified WWW access to a catalog for automated ordering.

The data requirements are being developed through use of JDBC reverse engineering methodology. The process is to take the physical models of five system databases (F-14D, UTD, UH-1N, MODSAF, and Source) and normalize these into logical data models that are then integrated into an SAI model that is the initial UTSS database logical model. Data standards will be based on that model and that model will be used to derive the UTSS physical database. NAWC Indianapolis will be the initial testbed facility for UTSS and is responsible for system integration, database design, and software development. It is being assisted in data requirements, modeling and standardization by JDBC with additional contractor and government support for interface requirements analysis and specification development, real-time simulation software expertise, and simulator Subject Matter Experts.

Status: they have completed the logical data models for ModSAF, UTD, F-14D, UH-1N, IECSS, and AH-1W but these are awaiting verification from developers. They are beginning to model the source databases and to integrate the data models into a global threat data model to be used for UTSS database design. The NAWC testbed facility has three builds scheduled: April, June, and September and appear to be on schedule. They are working with DIA to begin the formal DIA data acquisition.



The benefits of data modeling is that it: (1) identifies standard representations for threat data within M&S applications (can be used for future developments); (2) aids in fidelity assessment of simulator software; (3) aids in assessing interoperability of models; and (4) has helped developers and maintainers to better understand their data.

Data Modeling Lessons Learned: (1) documentation of simulator databases is often scarce, of poor quality, non-existent, out of date; (2) IDEF1X, though not perfect, can be used to model a variety of data implementations (RDBMS and flat files); (3) with minimum training (1 hour) simulator maintainers and developers can understand enough of IDEF1X to review data models; and (4) the most effective data model development has been off-site development of draft models using available documentation followed by an on-site visit.

Issues are (1) data tagging (source, classification, validity and dates); (2) multilevel security (initial plans for system high repository, future to do distribution via trusted system, have not addressed data aggregation issue); and (3) availability of data (some data (US/friendly) is difficult to obtain, simulators often use "best estimates."

UTSS also has a very active Standards Working Group (SWG) consisting of Service, DIA and industry participants. They have developed a standard architecture build process that will go from Strawman document to Ironman document to Goldman document. SWG issues include need for more Army and Navy funding, need to interface with other DMSO projects working on standard architectures, and need to prove their architecture is workable.

#### **Ms. Susan Solick: VV&A of Distributed Simulations Project**

This project used the IDEF0 process to review, refine and expand the standard DIS VV&A process model approved at the 10th Workshop on Standards for the Interoperability of Distributed Simulations. The first year of the project addressed M&S verification and the second year will address validation.

Ms. Solick is responsible for the data consistency task and has made an initial pass at decomposing the data VV&C portions of the M&S verification process. The DRTWG Data VV&C Guideline Subgroup had given her some higher level inputs via the co-chairs (Mr. Bob Hartling and Mr. Mark Ralston) who are active on this project and the DIS VV&A effort. The Data VV&C Subgroup has selected Mr. Jeff Rothenberg (who is developing the data quality profile) to work with Ms. Solick on the data VV&C effort. Since the completed IDEF0 model specification will contain approximately 60 activities and over 100 pages of written activity procedures and ICOM definitions, Ms. Solick's effort will require an in-depth review. She invited DRTWG members to share data issues with her at the Data VV&A Guidelines Subgroup meeting.

There was some discussion (as before) on what it meant to be compliant and compatible with DIS. What is required in compliance testing of data, for example. It was also pointed out that the OSD acquisition process doesn't allow for development of a DIS simulation as shown in Bob Lewis' IDEF0 process model. The problem is current acquisition policy requires deliverables be declared in upfront documentation.

The VV&A project interim deliverables include a methodology handbook, an IDEF model specification for VV&A of distributed simulations, and a compendium of high resolution algorithms. Future activities are to: further decompose the data portions of the model; reconcile compliance testing specification with IST compliance test suite; test the process; complete the methodology handbook; begin the implementation guide; and establish second year funding for V&A portions of the program.

### 3.7 REPORTS FROM OTHER GROUPS

#### **Mr. Peter Valentine: Report on IEEE/CS/SESC IDEFIX Standards Working Group 1320.2**

The philosophy of standards is that a standard should address the needs of its users. These needs change over time and needs of individual users change at different times. Therefore, a standard must address a range of needs, supporting both historical and emerging practices.

The objectives of WG 1320.2 are to develop IEEE (ANSI-level) standards for IDEF1X (syntax and semantics and the user guide) and evolve the language and practice standards in parallel with the needs of the users.

Currently, the WG is working on (1) completing the annotation of the IDEF1X formalization to make it more accessible; (2) completing specification of an optional constraint language; (3) revising the baseline draft to accommodate enhancements; and (4) beginning development of a user guide.

Mr. Valentine discussed:

- The need for a metamodel to put in the repository to be able to interchange data models using CDIF. The objective is to get from many versions of the IDEF1X language to a common formal version.
- That the rule constraint language (RCL) will allow one to state data derivations.
- That the IDEF group will probably be merging with the Business Process Re-engineering (BPR) group that used IDEF0 since about 90% of the IDEF1X WG people are IDEF0 practitioners.
- IDEF3 will add state to IDEF0 modeling and IDEF4 is addressing object-oriented modeling. There is no logical connection or progression among the IDEFs.

A question was asked about their addressing complex data and the answer was that the WG focus is more on business applications than scientific and technical data. However areas relevant to complex data that are being addressed are providing object identities; expanding the RCL to describe methods; and looking at abstract data types (i.e., simple domains). Structural complexity could be handled through ADTs.

Ft. Huachuca will be hosting the next WG 1320.2 meeting on February 24-26.

#### **Ms. Rebecca Wade: Department of the Navy Data Administration**

Ms. Wade is the Navy Component Data Administrator (CDAd) from the Naval Information Systems Management Center (NISMC). They are currently in the startup phase of DA (before 1988-1989 there was no enterprise-wide view in DON). This includes concept definition (understanding), developing terms of reference and roles and responsibilities, training, putting the processes in place (mainly for data modeling and DE standards), finding the resources and defining the issues. The DoD policies and procedures stop at the CDAd door, there is no real definition of how the Component should carry them out.

In the data modeling area: they are integrating data models and mapping names to the DDRS data elements since most of DON data elements belong to entities that are already approved. They are using the DON data model to support their activities, mainly as a holding place for DE development and a place for issues. They are making the DoD Data Model widely available throughout the Navy. Navy data elements that are approved can be downloaded through Technet. There are forms for becoming a Technet user and for becoming a DDRS user. They set up meetings for modeling Navy information and are trying to track the modeling groups. They use the PCAT tool for accessing the DDRS (the PCAT tool is available for downloading through the MSRR). The Enterprise Bulletin Board at DISA is also available for use.

To understand your data elements you need to understand your policies, be able to access data element metadata, and relate all to a data model. This is what one does in an interim repository. They need data elements within a context to support a particular functional area or system. They need to develop an information map, baseline Navy requirements, and priorities to enable the development of a transition strategy to move to standard data elements. There also has to be continued support of Navy legacy systems.

They have over 1,000 data elements in the SDE approval process and if GCCS lives up to its DE commitments there could be many more standard data elements. She is not sure if the Navy has determined all of its requirements for a dictionary and it may turn out they will need a Navy-wide data dictionary. The Navy needs to include DA in its other policies.

There are resource issues because it is difficult to get institutional support for DA. Issues include future requirements and validity and credibility. There needs to be a balance between requirements so that a "to be" approach can be mapped back to transition from the "as is."

Their overall status is: they are in the startup phase with initial operating capability and have begun implementation.

### 3.8 REPORT ON THE M&S COMMUNITY DIRECTORIES

#### **Ms. Peggy Gravitz: Report on the M&S Community Directories**

The M&S and Database directories have had many names. At a recent meeting at Ft. Huachuca (Feb. 13-14) for the purpose of integrating the Authoritative Data Sources data model into the existing M&S and Database Data Model and extending the combined model to accommodate relevant DMA Catalog metamodel entities and data elements it was agreed to by those present to call the directories the "M&S Community Directories." However, at the time this brief was given, the data models had not been integrated and Ms. Gravitz was only addressing the M&S and Database directories.

The purpose of the brief was to describe a phased approach for developing the M&S Community Directories for the MSRR. This is a DMSO FY95 investment to SSDC with their COLSA contractor carrying out the effort. COLSA previously developed the integrated M&S and Database Data Model with DMSO support.

- Phase I: automate current DMSO M&S directories with a WWW interface and add the Database Directory.
- Phase II: develop a standard WWW hypertext document format based on the M&S Community Directories logical data model and provide WWW interface enhancements for data entry/browsing/retrieval.
- Phase III J: assist each Proponent M&S directory custodian, at their site, in the installation of their M&S directory links to the MSRR through the WWW.
- Phase IV J: develop a physical M&S Community Directories database implementation based on the M&S Community Directories logical data model with a WWW interface.

### 3.9 REPORTS FROM DISA/JIEO

#### **Mr. Peter Pasek: DoD Repository**

Mr. Pasek joined DISA/JIEO recently as part of the transfer of the Army data standards people (Jim Glymph's group) to DISA. Current DISA tools are the Defense Data Repository System (DDRS), the DIST, and the interim repository. The future potential repository solution for DoD will be based on COTS software. Mr. Pasek said that many years ago the Army had Lawrence Livermore Labs define a data encyclopedia architecture for them and then decided it was overkill and went on to build the Army Data Dictionary system. The Army Corps of Engineers developed the ADD which is the "grandfather" of the DDRS. Today we have DoD 8320, agreed on IDEF methodology, database management maturity, and IRDS - all things that were not available ten years ago. These can all help define the future repository product.

He defined a repository as: a specialized application that provides for shared storage and common access for data and objects required to support enterprise information systems and database development and reengineering.

They are building a Repository Information Model (RIM) made up of schemas, etc. of other tools. This was the result of the DIRS project. The objective is to get the DDRS database schema, IDEF repository, DIST tools, and the ADD all defined in a global schema. RIM will be used as the basis for selection of the DDR COTS tools but all the other systems will not go away. Through system integration, the new repository will be able to access all the older tools. The DDRS may still be used for entering data elements.

The DDR project has been gathering many requirements. The DDR steering committee direction is more focused on getting the new requirements into the new repository than on fixing the shortcomings of the DDRS in the new repository. They are currently involved in acquisition and by February will have a statement of work and will acquire the DDR through a private RFP process with Logicon as the integrating contractor. They expect a contract award by June since this is a private RFP not subject to the GSA. They expect to have an operational system by 30 September that will be a COTS tool with limited capability. Carl Palmer is directing the resources for DDR development.

The first phase of the DDR will be to serve data administration users, data modelers, data standards people and software developers. The DDR will be an evolutionary product, it will be termed a prototype. It will really be performing as a frontend integrator to existing tools. It will be on the same box as the DRS but people will need to buy a workstation to use it since it is a client/server architecture and the client software will reside on a PC. DoD will have an option to buy six server products. The requirements selection is being made in view of what can be done in one year for under \$1,000,000.

He gave us one page of potential repository objectives which include reuse/reshare models and metadata information between systems, databases, and systems development tools; document current system process, and data environment; identify data location, usage and access; map current data, process and system information to models; facilitate effective technical communication of models and metadata between organizations and the business; etc. He also gave us a one page list of potential repository requirements that are rather general and not unexpected.

He showed a final viewgraph of the expected solution which will support multiple languages; multiple data dictionaries; multiple DBMS schemas, mappings, DDLs, tables; multiple methods, techniques and standards; multiple development tools using CASE metadata exchange; etc.

**Ms. Miranda Stern: Data Quality and Security**

The focus areas in data quality and security are: (1) data quality in AIS migration; (2) tools; (3) baseline quality assessment (using the Automated Resource Management System (ARMS) and Solid Waste Automated Repository (SWAR) as pilot studies); (4) data quality and data security guidelines; and (5) guidelines for metrics (QA). The DA goal 4 establishes the data quality management process "...ensure that DoD operations and decision making are supported with data meeting needs of availability, accuracy, timeliness, integrity, and need-to-know requirements."

The DoD definition of data quality is: "The degree of compliance between an organization's data environment and its "business rules." (The DRTWG attendees seemed to have a problem with this definition.) She showed the data quality in AIS migration as first establishing quality and cost baselines in legacy systems, then improving the quality in transitioning to migration systems through selection of the best sources, and finally building data quality into the target systems. She gave us a list of data quality tools and showed interest in the new DQE tool developed at CENTCOM.

There was a separate short brief on data quality metrics that addressed DoD data systems in general: the percentage and number of DoD standard data elements in each migration/target system; percentage of DoD migration/target systems using shared databases and DoD standard data elements; percentage of user data that meets established data quality standards; etc. They are using selected data administration metrics for doing evaluation and assessments. The questions asked are very broad, such as are common databases used when service-unique databases are not required; does a database application use relational theory; was a database designed using standard data modeling techniques; was the database based on the DoD data model; etc.

**Ms. Angela Booker: GCCS Data Standardization**

The C3 FAd is Ms. Deborah Castleman, who is the DASD(C3); Ms. Booker is the C3 FAd Alternate POC. The C3 FAd mission: achieve a fully interoperable C3 environment through effective data standards coordination and program development, including data element and data models for C3 projects, programs, and migration systems.

The GCCS migration systems/databases include: GSORTS, DART, LOGSAFE, FAPES, JFAST, OSS, ATO/ACO, and JOPEs. These have been reengineered to identify their data elements and have undergone data modeling to show overlaps in data elements. Efforts in data element production have included consolidating GCCS data requirements from Component systems; performing collaborative data modeling; and extensions to the C2 Core Model which are ongoing and result from C3 functional area data model development and functional process improvement projects.

For the collaborative modeling process, they: develop and review read-ahead packages, monitor/support the sessions, and prepare the proposal package. They have 36 collaborative clusters planned. The one on GEOLOCATION (that M&S took part in) started in September 1994. Concurrent efforts are going on in all the collaborative modeling subject areas: ORGANIZATION, MATERIEL, FACILITY, TRANSPORTATION, OPERATIONS, PERSON, PLAN and INSTALLATION. On the GEOLOCATION collaboration, they developed a C2 model for generic location instead of using a model from another community. Some people felt that the right people weren't at the session, and some felt that the way of doing it wasn't right. The process was to develop the TO-BE model and then use existing systems to validate it in order to discover data to carry forward.

Functional process improvement has been carried out by SOCOM and others with CIM central funding. They get the To-BE pictures and then merge these into a C3 data model. They are also looking at the Defense Message System (DMS) because they know that message data is

important. TADILS and USMTF (sister divisions to her division) are moving their message data elements into data standards. They are beginning to map this data to the C3 Core Data Model.

JOPES data has been submitted for standardization using the data elements in the 1993 data model. JOPES data bypassed the DA process and has been rejected by two FDAdS

The JTF ATD (John Schill/ARPA) (architecture by Rick Hayes-Roth) is managed by Howard Frank (ARPA) who is interested in data modeling as part of the LEE GCCS effort. GCCS has reengineered the migrating systems and mapped the data elements back to the C2 Core Data Model. They will use standard data elements in the GCCS Version 3.

C3 data element status from the C2 Core Data Model, Version 2 of GCCS, February 7, 1994:

	Prime Words	Data Elements
Candidate	20	89
Standard	106	289

### **3.10 ACTION ITEMS**

1. **Iris Kameny:** Form DRTWG small group to address STOW 97 fast data build (96 hours in crisis) requirement.
2. **Iris Kameny:** Get Joint Warfare Simulation Object Library documents for August and March. Charles Herring has been active on this project and will be moving to DMSO and will be the one to bring commonality to environmental data standards.



#### **4.0 NOTES FROM DATA VV&C GUIDELINES SUBGROUP MEETING AT IDA**

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#### 4.1 AGENDA

FEBRUARY 8, 1995 AT IDA

- 1300 - 1315 Introduction, review of task proposals, status of DMSO approval/funding: Mr. Mark Ralston and Dr. Chien Huo
- 1315 - 1345 Task 1 plans: Lt Col Dennis Lester
- 1345 - 1415 Task 3 plans: Mr. Mark Ralston
- 1415 - 1445 Report on VV&A of DIS efforts, requirements for incorporation of results into Task 2: Ms. Susan Solick
- 1445 - 1500 Break
- 1500 - 1530 IDEF0 briefing from contractor. (Contractor selected by DMSO to support IDEF0 modeling in Tasks 1 and 3 presents overview of IDEF0 and talks about requirements from participants.)
- 1530 - 1630 Brief overview from each case study organization representative on the process that they will model for Tasks 1 and 3. Q&A with IDEF0 contractor on the modeling process. (Need to make sure that as many case study organization reps as possible will attend.)
- 1630 - 1700 Preliminary schedule discussions, Q&A with task leaders: Mr. Mark Ralston and Lt Col Dennis Lester

#### 4.2 ATTENDEE LIST

### DATA VV&C GUIDELINES SUBGROUP MEETING AT IDA WEDNESDAY, FEBRUARY 8, 1995

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4.2 FEBRUARY 8, 1995 ATTENDEE LIST (Cont'd.)

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### **4.3 MAIN OBJECTIVES OF MEETING**

The objectives of the meeting were (1) to review current plans on how tasks 1 and 3 would be performed including the schedule; (2) making everyone familiar with the case study organizations and what processes they are likely to model and issues they face; (3) having JDBE facilitator describe how the IDEF0 modeling would be supported; and (4) arranging for the initial kickoff meeting.

#### 4.4 MEETING NOTES

##### **Dr. Chien Huo: Tasking and Funding**

Dr. Chien Huo described how he wanted to handle the tasking and funding. He discussed milestones that need to be met to be compatible with the Defense M&S Master Plan. Each case study leader needs to tell Chien his organization's financial person (name, phone, fax, address) and use of funding as to whether it is to be spent by government (reimbursable) or to go to a contractor (direct cite). The task leaders have the responsibility to check on this paperwork and let him know if there are any problems.

##### **Lt Col Denny Lester: Task 1 non-DIS User Data VV&C**

Lt Col Denny Lester presented the Task 1 effort: to develop guidelines for non-DIS user data VV&C. The approach (same for Task 3) was to divide the task into four subtasks:

1. Develop study plan, do literature search
2. Provide IDEF0 training and tools and develop IDEF0 VV&C process model for each case study
3. Review, compare and integrate process models to develop generic IDEF0 Model(s)
4. Document methodology and criteria, develop recommendations on IDEF0 VV&C process and write study report

Four out of five case study leaders and possible M&S have been identified for Task 1:

- USAF — Lt Col Denny Lester, TACCSF (TACCSF)
- USA — Mr. Howard Haeker, TRAC (JANUS)
- Navy — Mr. Jerry Hoffman, SPAWAR, (ITEM, campaign level model)
- JCS — ?
- OSD — Mr. Eric Keck, JADS-JT&E, (JADS)

Task 1 will run from March 95 to end of March 96. A study plan with detailed schedule will be delivered by the end of March 95. Subtask 2 (individual case studies) will begin on April 1 and be completed by September 1, 1995. Bulk of the effort for Subtask 3 will be completed after September 1, when all the case studies will have been completed.

Denny Lester said they would use IDEF0 for process modeling of the organization's VV&C process and then use IDEF1X and/or an object-oriented modeling technique for the actual data modeling of the M&S data. [IRIS' VIEW IS THAT THE DATA MODELING IS MUCH MORE THAN WHAT WE NEED. WE ARE ONLY DOING PROCESS MODELING TO BETTER DETERMINE GENERIC VV&C PROCESSES APPLIED TO INSTANCE DATA. THIS DOES NOT REQUIRE DATA MODELING AT THIS TIME. HOWEVER, CARRYING THE VV&C PROCESS TO A DETAILED ENOUGH LEVEL COULD PRODUCE DATA FLOWS OF METADATA DESCRIBING THE DATA QUALITY. I BELIEVE THIS WOULD REQUIRE MUCH MORE EFFORT THAN WE CAN AFFORD FOR NOW. PERHAPS MORE DISCUSSION IS NEEDED ON THIS TOPIC.]

Denny said that we need to discuss the coordination process since OSD has formalities about reviews and timelines. He foresees there may be problems getting OSD and JCS to participate in a timely fashion.

He also suggested that in subtask 3, when we are developing generic models, we may want to include people from the M&S organizations to prevent an AS-IS rice bowl process from overpowering a better TO-BE process.

Denny Lester's e-mail notes contained these issues and concerns.

**Issues:**

1. Determine the relationship between IDEF0, IDEF1X, and Object-Oriented data methodologies.
2. Can a cost analysis be performed as part of the tasks to determine national funding required to do data VV&C? [IN THE DISCUSSION DENNY OFFERED THAT BOB LEWIS HAS LOOKED AT 50 CASES FOR VV&A AND CAN USE THESE TO PREDICT WHAT IT MIGHT TAKE TO DO VV&A. WOULD IT HELP TO TRY TO ESTIMATE THIS WHEN DOING THE CASE STUDIES?]
3. Can non-combat models be addressed in tasks?
4. Can the case studies include models at all levels in the modeling and simulation hierarchy (i.e., engineering, engagement, operational/mission, and campaign)?
5. How can the case studies/tasks be integrated? Can an end-to-end case study be performed (i.e., Task 3 feeding Task 1 feeding Task 2)?
6. Determine how RAND's Quality Program may be tied into these tasks.
7. Determine who should be invited to task working group meetings, how often should joint task meetings be held, and who should accompany JDBE representatives to site surveys (if necessary).

**Concerns:**

1. JDBE appears to be better versed in IDEF1X than IDEF0. Do we need to invite anybody else (e.g., BDM or COLSA) to augment JDBE.
2. Over-reliance on JDBE to integrate process models from case studies within the tasks without proper supervision.
3. Making sure we can describe the process models for data VV&C in terms which can be understood by a diverse community, e.g., data experts, modeling and simulation users and sponsors, educators, etc).

**Mark Ralston: Task 3 Data Producer VV&C**

Task 3 subtask descriptions are the same as the task 1 subtask descriptions.

Mark identified the five task 3 organizations and POCs:

- DMA, Dave Danko, geo-physical data collection
- DIA, Richard Bernstein, intelligence data collection
- US Army OPTEC, Kerry Wyant, operational test data collection
- Naval Oceanographic Office, Eleanor Schroeder, oceanographic data collection
- National Air Intelligence Center, Ray Pershing, aircraft technical data collection

Task 3 milestones: are similar to the Task 1 milestones

**Analysis Issues:**

1. Can we define a generic VV&C process for DoD data producing organizations?
2. What are the similarities and differences in the processes used by DoD data producers to perform VV&C?
3. What tools and techniques should be used for data VV&C by DoD data producers?
4. What costs are incurred by the use of data VV&C techniques at DoD data producing organizations?
5. What are the benefits/savings accrued by the use of data VV&C techniques at DoD data producing organizations?

**Planning Issues:**

- Selection of processes within case study organization
- Development of generic process model/models
- Feasibility of obtaining cost/benefit data

- Coordination of tasks 1 and 3, integration of results
- Planning meeting schedule
- IDEF0 modeling schedules, SME availability, training

Mark Ralston laid out the study report:

- Consolidated with task 1 and 2 reports
- Identifies generic processes
- Identifies methods, tools, and techniques
- Formulates VV&C guidelines
- Published as a DoD instruction

**Susan Solick: Task 2 DIS User Data VV&C**

Susan went over the DIS Exercise Process Model showing VVA/C and detailed charts on how she has expanded on the data VV&C at appropriate places in the process. [FROM IRIS: WE REALLY NEED TO FORM A SMALL GROUP TO EXAMINE THESE MORE CLOSELY AND GET BACK TO HER]>

The current status for DIS data VV&C:

- VV&C model decomposition is complete
- Final draft of manager's guide is ready for distribution by March 1
- First draft of implementation guide is in progress
- IDEF0 model and specs of VV&A process: verification portion will be ready by April 1 (validation is objective of next phase)
- Continued coordination with other groups

Susan said that there will be a hole in Task 2 with respect to VV&C related to M&S validation since that is their project's phase 2 effort and hasn't begun yet. However, they are beginning to agree on the terms of compliance and compatibility with DIS. There were questions as to what is meant by a data set being compliant/compatible with DIS.

Susan said there will be a DIS data issues subgroup at the next DIS WS to discuss VV&C-VV&A interactions; repository relationships; VV&C role; and SIMWORLD and MSRR.

**Gary Lambert (JDBE):** Gave an overview of IDEF0.  
TASK 1 CASE STUDIES WERE BRIEFED.

**Rick Munro (Navy/ITEM):** Issues included use of service accepted M&S products; how M&S are used varies; and the data sources used in a model may vary with the different purposes of use.

**Cathy Corley (USA/TRAC/TADS):** TADS supplies data to VIC, EAGLE, JANUS, CASFORUM, battle labs. The case study will have to focus on one of these. They support the need for a cost/benefit analysis to understand how much data VV&C is worth doing.

**Tony Brozena (Air Force):** Discussion of tying choice of model/application to need for producer data such as DIA so that we can follow thread of producer data VV&C to use of the VV&Ced data in non-DIS user data VV&C.

TASK 3 CASE STUDIES WERE BRIEFED.

**Kerry Wyant (Army OPTEC):** Their data is not used by others now but they are interested in their To-BE data and what kinds of quality testing that will require. What quality assurances have to be done to make their data reusable by others?

**Dave Danko (DMA):** They have 300 product lines, each with a different VV&C process. On the other hand, he expected that there might be a similarity between DMA data VV&C and the Navy oceanography data VV&C.



**Eleanor Schroeder (Navy):** They have the same problems as DMA. Different products have different VV&C processes.

**Richard Bernstein (DIA):** They have order of battle and facilities data. Data VV&C is done by analyst as the data is put into the database. Substantive VV&C stops with the analyst. Some problems with their databases is that they need metadata about the database. Questions were asked about some of their unusual data structures: their data formats are structured to be able to describe many different facilities and OBs.

**Ray Persing (AF/NAIC):** They address aircraft design and have aircraft performance data for all the aircraft in the world. Their data is documented but they perform informal VV&C. Sometimes for a new aircraft, they have to validate data against best existing aircraft/systems. A concern they have is with where to stop the VV&C process (how much is enough?)

## 4.5 ACTION ITEMS

1. Conduct kickoff meeting in Albuquerque on February 27-28 for: Task 1 and Task 3 leaders, supporting organizations, case study representatives, and JDBE IDEF0 facilitators
2. Task 1&3 leaders will provide update task descriptions as soon as possible to Chien Huo and Iris Kameny using new template provided by Iris Kameny.
3. The Task 1 leader (Denny Lester) will provide addresses for his case study budget POCs.
4. Add to current Data VV&C Task Description: delivery of a draft final report by 31 Dec 95 and requirement for intra-service/department coordination.
5. Task 1 and task 2 leaders are to confirm that all case study participants have received funds by 27 Feb. Exception is that Task 1 will not have commitment from JCS until after the kick-off meeting in Albuquerque

### **Denny Lester: Suggested Additional Actional in his E-mail Notes**

1. Determine site preparation requirements prior to interviews being conducted by JDBE at each case study location.
2. Build a library of appropriate data VV&C references.
3. Develop a PERT diagram of Tasks 1 and 3 and stop-light charts to monitor milestone completion.
4. Develop a list of Data VV&C POCs and subject matter experts.
5. Investigate the possibility of starting an e-mail reflector system for the folks supporting the Data VV&C tasks.

**5.0 NOTES FROM JOINT MEETING OF DMSO VV&A TWG AND THE DRTWG  
DATA VV&C TASK FORCE AT IDA**

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## 5.1 AGENDA

THURSDAY, FEBRUARY 9, 1995

- 0800 - 0830 Objectives of VV&A TWG and Progress: Dr. Pat Sanders
- 0830 - 0900 Objectives of Data VV&C Task Force and Progress: Ms. Iris Kameny
- 0900 - 1000 Discussion of Common Topics and Interfacing Arrangements: Led by Dr. Pat Sanders and Ms. Iris Kameny

## 5.2 ATTENDEE LIST

### NOTES FROM JOINT MEETING OF DMSO VV&A TWG AND THE DRTWG DATA VV&C TASK FORCE AT IDA THURSDAY, FEBRUARY 9, 1995

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### **5.3. MAIN OBJECTIVE OF MEETING**

This was the first joint meeting of the DMSO VV&A TWG and the DMSO DRTWG Data VV&C Task Force. The objective was to familiarize each group with the objectives and accomplishments of the other group so that there can be better coordination and cooperation in the future. In the past, this has been done informally mainly by a few people talking outside of scheduled meetings.

## 5.4 MEETING NOTES

It was announced that Priscilla Vanderpool is the DMSO technical support representative for VV&A. The DMSO representative for the DRTWG is Dr. Chien Huo.

### DR. PAT SANDERS DISCUSSED THE OBJECTIVES AND PROGRESS OF THE DMSO VV&A TWG

The VV&A TWG wrote the M&S VV&A section of the Defense Modeling and Simulation Master Plan (Sub-objective 5-2, see Appendix A attached). The data VV&C TF contributed the VV&C part of that sub-objective. The VV&A TWG has also been working on the investment plan to support the master plan objectives, staff development for VV&A practitioners, and writing VV&A documents.

The main issue with VV&A is affordability. How much V&V is enough for a given purpose, how much can one afford, what does what is affordable buy you, etc.

The DoD instruction for VV&A is out for review and makes V&V an integral part of model development. The V&V of a model is to be documented in an accreditation report that will be available to users interested in reusing the model. The VV&A TWG has addressed distributed and joint simulations as well as single Component M&S by providing flexibility for an individual Component to address the V&V of their own models but requiring some form of common studies for a joint model. The VV&A process includes the VV&C of data used by the M&S.

M&S VV&A/C will become more important as M&S results are used more and more to feed into the decisionmaking process. Dr. Sanders expects the Defense Science Board (and others) will be requiring increased assurances that an M&S and its data have been VVA/Ced when recommendations are made to decisionmakers that are based or backed up with M&S results.

How do we need to go about accrediting M&S? We need some draft procedures to try out on prototypes before releasing procedures to the community. The currently planned pilot studies on complex models include an ALSP confederation and DIS.

A question was asked about how to do VV&A on a M&S that will be used to affect the acquisition of a weapon system that doesn't exist. A relevant answer may have been offered on the previous day at the Data VV&C Guidelines Subgroup meeting when Ray Persing (National Air Intelligence Center) told us how they model information about a new foreign aircraft by filling in missing information based on the new aircraft's similarity to existing aircraft for which they have more complete information.

The VV&A TWG is focusing on what degree of validity is needed for a M&S based on its purpose. They intend to work with M&S VV&A histories. The credibility of a model will be built over time based on its VV&A history and the credibility of its past results (even if these were to answer slightly different questions). An issue is how to document this historical information and maintain it in a repository so it will be available to M&S users.

Dr. Sanders suggested that we get briefed by the Synthetic Theater of War (STOW) people so we can understand how they intend to connect models and what VVA/C they plan to do.

The VVA/C actions from the Defense Master Plan Objective 5-2 are listed in Appendix A. The FY95 VV&A plan allocates effort/funds at 36% to standards and guidelines; 61% to prototype applications; and 3% to accreditation support services. The accreditation support services are mainly in support of CINCs who are asking how to do M&S VV&A.

DMSO is developing staff to help carry out the Master Plan activities. There are plans to have academic support, support from the SMART program team and from ILLGEN. The VV&A TWG and DMSO are developing an execution plan.

**Iris Kameny: Discussed the Objectives and Progress of the Data VV&C Task Force**

The three main objectives of the Data VV&C TF are to (1) develop guidelines for performing data VV&C in coordination with VV&A; (2) identify and collect information about authoritative data sources and define their responsibilities; and (3) address the role of M&S data centers between data sources and simulation centers. The first objective is being addressed by the Data VV&C Guidelines Subgroup and the last two objectives by the Authoritative Data Sources Subgroup.

The Data VV&C Guidelines Subgroup has: (1) developed definitions for VV&C (in which a distinction is made between producers of data for general use (e.g., DMA and DIA) and data developed for use in specific M&S); (2) are developing a quality profile for data in a database/dataset that describes and asserts the VV&C of the data; (3) undertaking tasks this year to develop policies and procedures for performing data VV&C for non-DIS data users, DIS data users, and data producers; and (4) supporting the identification and development of tools to be used in data verification and validation (in particular the portability of the CENTCOM data verification tool).

The Authoritative Data Sources Subgroup has been (1) developing definitions for authoritative data sources, data center, and responsibilities of data sources and users; (2) defining the Authoritative Data Source (ADS) Directory metadata, data model, and taxonomy of data categories to be used in acquiring ADS and searching for them; (3) addressing how to collect the initial ADS information through the Component M&S offices and populate the directory; (4) making the ADS Directory available in near-term through the Interim M&S Resource Repository (MSRR) system; and (5) addressing the roles of data sources, data centers, etc. especially with respect to releasability and sharing of data (in coordination with the new Data Security Requirements TF).

**General Discussion:**

Dean Freed said the Navy is trying to get their ITEM model accredited. Bob Hartling (a co-chair of the Data VV&C Guidelines Subgroup) will be working with him to develop a VV&A/C team. The VV&A group will be developing procedures by building on what has been previously done (by Dale Pace for Navy VV&A) and what is occurring in the DIS community.

Someone mentioned that two months ago the JS formed two working groups addressing VV&A [IRIS' NOTE: I LOST THEIR NAMES AND OBJECTIVES.]

It was recommended and agreed to that there be joint VV&A and VV&C meetings twice a year. These could coincide with the DRTWG semiannual meetings. In the interim each group will delegate a representative to work together in order to identify pilot studies for both groups to participate in.

The VV&A TWG will be doing pilot studies this year, possibilities include ALSP and ITEM. Jim Watson said that the A2ATD is also planning to do VV&A implying that this could also be a potential pilot study.



## **5.5 ACTION ITEMS**

1. Dr. Chien Huo will work with Dr. Pat Sanders to identify representatives from the two groups that will coordinate the pilot studies being undertaken.
2. Dr. Chien Huo/ Ms. Iris Kameny will coordinate with Priscilla Vanderpool on the next joint VV&A TWG and Data VV&C TF meeting.

## **5.6 APPENDIX A: MODELING AND SIMULATION MASTER PLAN SUB-OBJECTIVE 5-2**

Sub-objective 5-2: Develop methodologies, standards, and procedures for the VV&A of models and simulations and the verification, validation, and certification (VV&C) of data).

VVA/C actions from the Defense Master Plan Objective 5-2 are:

- (1) Publish a DoD document establishing policy and assigning responsibilities for VV&A of M&S. Coordinate in FY95, promulgate in FY96. (PR:USD(A&T))
- (2) Develop prototype applications of VV&A to assess the trade-offs between the cost and time required for VV&A (using varying procedures) of M&S in various categories and the M&S improvement achieved under varying model circumstances (such as the maturity and complexity of the models). Perform pilot VV&A efforts in FY95 and FY96. (PR: MSWG)
- (3) Establish general VV&A standards and procedures for M&S applications and specific standards and procedures as required for each M&S category in FY96. (PR: USD(A&T))
- (4) Provide on-call technical support services to accreditation authorities beginning in FY96. (PR:DMSO)
- (5) Publish a DoD document setting policy and assigning responsibilities for VV&C of data; coordinate in FY96; promulgate in FY97. (PR: USD(A&T))
- (6) Establish VV&C standards and procedures for M&S applications in FY96. (PR:USD(A&T))
- (7) Develop metrics for measuring data quality by second quarter FY96. (PR:DMSO)
- (8) Once VV&A or VV&C has been performed, make histories of activities and results available to M&S community through the resource repository system. Initiate in FY95. Ongoing. (PR: DoD Components)

**6.0 NOTES FROM AUTHORITATIVE DATA SOURCES SUBGROUP MEETING AT  
IDA**

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## **6.1 AGENDA**

**THURSDAY, 9 FEBRUARY 1995**

- 1030 - 1200 Data Sources Survey - Mike Hopkins
- 1200 - 1230 Lunch
- 1230 - 1330 Data Sources Responsibilities - Mike Hopkins
- 1330 - 1345 Break
- 1345 - open Data Taxonomy - All

## 6.2 ATTENDEE LIST

### AUTHORITATIVE DATA SOURCES SUBGROUP MEETING AT IDA THURSDAY, FEBRUARY 9, 1995

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### **6.3 MAIN OBJECTIVES OF MEETING**

This meeting had three objectives: (1) to determine the status of the JM&S Data Sources Survey; (2) to discuss data source responsibility issues; and (3) to finalize the JM&S taxonomy for data sources directory. Objective (1) was met. Objective (2) resulted in an action item due in by 26 April. Intermediate deadlines are 12 April and 19 April. Objective (3) resulted in the taxonomy being baselined pending final input from the working group members, comments from the DRTWG, & action items due in by 28 February.

## 6.4 MEETING NOTES

### A. JM&S Data Sources Directory:

The latest version of the JM&S Data Sources Directory was distributed. Any changes should be directed to Mike Hopkins. Some discussion occurred on the DISA effort to identify source data. It was pointed out that the DISA effort covered all of DoD and was not limited to M&S data sources. The DISA survey is a potential source of data for our efforts. Currently the directory resides in a Word Perfect word processor file. The desire is to put it in a maintainable World Wide Web DBMS. (See Action Items.) This directory is intended to contain metadata information vice detailed catalogs. Pointers would be provided to the specific catalog (e.g. catalogs owned by the Defense Manpower Data Center). It is intended to serve as a sort of "yellow pages" for the M&S community. A concern was raised about the World Wide Web. Many of the DoD field organizations are not on the internet, much less have access to World Wide Web. Since it is assumed that these organizations comprise a sizable number of potential users of this directory, it was suggested that a gopher-type setup of the directory still be maintained through DMSO's MSIS. Also mentioned was a meeting to be held at Fort Huachuca, AZ on the 13th and 14th of February to model this effort in line with the M&S directory effort being performed by COLSA.

### B. Data Source Responsibility Issues:

An updated set of definitions for authoritative data source and data center was offered as well as updated responsibilities for both the data sources and data customers. Much discussion was generated. The end result was that definitions will be provided for authoritative data source, data source and data center. Responsibilities paragraphs will be drawn up for each of these categories. An initial draft will be ready for distribution to working group members by 12 April 1995. Working group members are expected to respond by 19 April 1995. A nonresponse will imply concurrence. (See Action Items)

### C. JM&S Taxonomy for Data Sources Directory:

The purpose of this issue was to construct a taxonomy of data that would break the authoritative data sources into more manageable pieces. The Army's data model was used as a basis with input from RAND. The taxonomy applies to both U.S. and other countries (i.e. DIA) data.

Discussion on this issue again took up most of the meeting. The taxonomy came much closer to finalization at this meeting. A couple of areas were unresolved due to action items not being done. Some areas were modified slightly. Modifications follow. See Action Items for those areas requiring some amount of rework. The current taxonomy can be found in the Appendices.

FINANCE: No changes made.

EQUIPMENT: No changes made.

TT&P COGNITIVE: Minor spelling error corrected in definitions. Otherwise, no changes made.

FORCE DESCRIPTION: Definitions of MASINT and SIGINT needed. HUMINT (Human Resources Intelligence) was removed. Its definition was substituted for HUMINT (Human Intelligence). A line is needed connecting the Marine Corps box.

**POLITICAL:** Minor typographical errors / grammar corrected in definitions. **DEMOGRAPHIC** is modified to **CULTURE/DEMOGRAPHIC**. Definition to be provided.

**HUMAN FACTORS:** Changes to definitions. In (d) perpetual was changed to perceptual. In (c) addition of stress and fatigue.

**INTER-SERVICE SUPPORT:** Category renamed to **SERVICE SUPPORT**. Much discussion occurred on the subcategories. New subcategory breakdown to be provided.

**SCENARIO:** Addition of **GUIDANCE, GOALS, PRIORITIES & OBJECTIVES** subcategory.

**TEST RESULTS:** Minor typographical errors in definitions corrected. Addition of subcategory **EXERCISE** to cover **DIS** exercises, **ATDs**, etc.

**UNIT PERFORMANCE:** Addition of sub-subcategory **OPERATIONS AND SUPPORT** under the **READINESS** subcategory.

**METADATA/STANDARDS:** No changes made.

**MISCELLANEOUS:** Subcategory **SOFTWARE** added.

**ENVIRONMENT:** Minor typographical and grammar errors corrected. Clarification of terms used in **TERRAIN** subcategories made. **SPACE/ATMOSPHERE** category modified to **SPACE / UPPER ATMOSPHERE**. Subcategories tentatively redefined. **WEATHER, OBSCURANTS AND MAN-MADE CONDITIONS** renamed to **WEATHER AND OBSCURANTS**. Subcategories renamed to **CLIMATOLOGY, DIURNAL, METEOROLOGY, OBSCURANTS, and DAY/NIGHT**. Tentative redefinitions of subcategories made. Definition of **NAVIGATION AIDS** sub-subcategory under **NAVIGATION** modified to include nautical, aeronautical and other. **IMAGERY** was added as a new **ENVIRONMENT** subcategory. Definition to be provided.

#### D. Other Business:

Concerns were raised on how the data sources were being obtained for the survey. It was felt that focal points for each of the services (Army, Navy, Air Force, Marine Corps, DMA, DIA, and JCS) were necessary to ensure that truly authoritative data sources were obtained. A concern was that there was no assurance that liaisons were made with all authoritative data sources and not with just M&S data sources. An action item was proposed to this effect. Possibly TWSTIAC and their contractor would work with representatives from each of the above named services to ensure that all needed data sources are identified and included in the survey prior to its being put on WWW. Known points of contact were: Ms. Lana McGlynn (Army MSMO), CAPT Bossio and/or Dr. Larry Wiener (Navy MSMO), Ms. Peggy Gordon (Air Force XOM), Mr Chris Gunther (DIA), Mr Bob Jacober (DMA), and COL Hanover (Marine Corps MSMO). The JCS representative was TBD.

The **NEXT MEETING** is tentatively being scheduled for Wednesday, 26 April 1995.



## 6.5 ACTION ITEMS

### A. JM&S Data Source Survey:

1. Chien Huo - To request that DMSO up the priority so that the JDBE project could build a temporary DBMS so that the survey could be maintained on WWW. Mike Hopkins will coordinate.

### B. Data Sources Responsibilities:

1. Bob Hartling, Matthew Aylward, Lana McGlynn, Teea Kim, Jim Watson representing Navy, Marine Corps, Army, Air Force, and user community will rewrite definitions for AUTHORITATIVE DATA SOURCE, DATA SOURCE, and DATA CENTER. Responsibilities paragraph will be provided for each. Initial draft to all working group members by 12 APRIL 1995. Comments required by 19 APRIL 1995. NOTE: No response will be taken as concurrence.

### C. Taxonomy - ALL Taxonomy action items are due by 28 FEBRUARY 1995; Mike Hopkins coordinating:

1. Bill Bowers - New subcategory breakdown for SERVICE SUPPORT. Will coordinate with Lana McGlynn and Mike Hopkins.
2. Dave Danko - Extend DEMOGRAPHIC subcategory definition (under POLITICAL) to include CULTURE. Define IMAGERY subcategory under ENVIRONMENT.
3. Bob Hartling - Provide definition of OPERATIONS AND SUPPORT subcategory under UNIT PERFORMANCE.
4. Allan Hess - Define SOFTWARE subcategory under MISCELLANEOUS. Further refine definitions under WEATHER AND OBSCURANCTS and SPACE/UPPER ATMOSPHERE subcategories under ENVIRONMENT.
5. Mike Hopkins - Define MASINT and SIGINT subcategories under FORCE DESCRIPTION. Work with BILL BOWERS to break down SERVICE SUPPORT.
6. Lana McGlynn - Work with BILL BOWERS to break down SERVICE SUPPORT.

### D. Other Business:

1. IRIS KAMENY - Coordinate with appropriate representatives from each service organization and TWSTIAC to ensure that all authoritative data sources are surveyed.

## 6.6 APPENDICES

### A. M&S Taxonomy Definitions:

1. **FINANCE:** finance refers to funds that are required to support activities such as Military/Civilian Pay Disbursing, Collection, Payment for Products and Services, Cash and Debt Management, Banking, and Financial Institution Services. The common thread through these activities is the determination of entitlement to money.
  - a. **SUBCATEGORIES:** TBD
2. **ENVIRONMENT:** data that represents the characteristics and features of the terrain, ocean, natural atmospheric conditions and man-made conditions.
  - a. **SUBCATEGORIES:** to follow in a later update
3. **EQUIPMENT:** equipment is a discrete element (e.g. a sensor, weapon, tank, etc.) that one can make characteristics & performance measurements on.
  - a. **EQUIPMENT PERFORMANCE:** data that represents how well equipment performs its mission functions.
  - b. **EQUIPMENT CHARACTERISTICS:** data that represents the physical description of a piece of equipment.
    - + Air: data regarding planes, helicopters and other equipment which performs its mission while flying; items which are essential to or support such equipment.
    - + Land: data regarding equipment which is used by ground based troops; items which are carried by or used by ground based troops.
    - + Sea: data regarding platforms and systems which are used primarily on the water; items which support water-based systems.
    - + Space: data regarding systems which perform its mission above the atmosphere; items whose purpose is to support such equipment.
    - + Missiles: data regarding missiles.
    - + Electronics/Sensors: data regarding communications, sensing, tracking, intelligence gathering and electronic warfare equipment.
4. **TACTICS, TECHNIQUES AND PROCEDURES COGNITIVE** - Data that represents the following:
  - a. **TACTICS:** employment of units in combat; the ordered arrangement and maneuver of units in relation to each other or to the enemy.
  - b. **DOCTRINE:** fundamental principles by which military forces or elements conduct operations.
  - c. **OPERATIONAL:** description of processes for carrying out mission functions.
5. **FORCE DESCRIPTION:** data that represents the organization of personnel and equipment that comprises force composition, unit composition, echelonment, and command relationships.
  - a. **SUBCATEGORIES:** to follow in a later update
6. **POLITICAL:** data pertaining to a state or its government.
  - a. **DEMOGRAPHICS/CULTURE:** TBD
  - b. **POLICY:** data pertaining to the administration, basic law, axiom, or doctrine of a state.
  - c. **ECONOMICS:** data pertaining to the production, distribution, and use of income, wealth, and commodities of a state.
7. **HUMAN FACTORS:** data that represents the interaction of people with equipment, environment, or other specified conditions.
  - a. **SUBCATEGORIES:** to follow in a later update
8. **SERVICE SUPPORT:** action by one military service or element thereof to provide logistic and/or administrative support within the service or to another military service or element thereof. Such action can be recurring or nonrecurring in character on an installation, area, or worldwide basis.

- a. SUBCATEGORIES TBD
  - 9. SCENARIO: a description of a military mission which includes its purpose, who is involved, the equipment they have, locations and times, environmental and political constraints and guidance as to how to perform the mission.
    - a. SUBCATEGORIES to follow in a later update
  - 10. TEST RESULTS: data that represents the examination, experimentation, or trial under specific conditions to prove the value, ascertain the nature, or ability of the system under investigation to meet requirements.
    - a. SUBCATEGORIES to follow in a later update
  - 11. UNIT PERFORMANCE: data that represents the force effectiveness.
    - a. SUBCATEGORIES to follow in a later update
  - 12. METADATA/STANDARDS: data about data including directory data; data about data standards such as process and data models, standard data element definitions such as are found in data dictionaries (e.g., the Defense Data Repository System (DDRS); symbology standards; and metadata about metadata (e.g., standard data element definitions for the data fields defined in DODI 8320.1-M-1).
  - 13. MISCELLANEOUS:
    - a. SOFTWARE: TBD
    - b. OTHER
- B. The "Almost Final" Draft version of the M&S Taxonomy
- 1. FINANCE:
    - <subcategories to be determined>
  - 2. ENVIRONMENT:
    - a. Terrain
      - 1. Boundaries
      - 2. Elevation
      - 3. Hydrography
      - 4. Industry
      - 5. Physiography
      - 6. Populated Places
      - 7. Transportation
      - 8. Utilities
      - 9. Vegetation
    - 10. Soils/Surface Materials
    - b. Oceanographic
      - 1. Geophysics
        - a. Geology
        - b. Acoustics
        - c. Gravity
        - d. Geomagnetism
      - 2. Bathymetry
      - 3. Oceanography
        - a. Hydrodynamics
        - b. Tides/Surf
        - c. Waves
        - d. Current
        - e. Sediment Transport
      - 4. Water Column
        - a. Ice
        - b. Visibility
        - c. Biologics
        - d. Water Quality
        - e. Physical Parameters
    - c. Weather and Obscurants

1. Climatology
    2. Diurnal
    3. Meteorology
    4. Obscurants
    5. Day/Night
  - d. Space/Upper Atmosphere
    1. Upper Atmosphere
    2. Near Space
    3. Space
  - e. EM/EO
    1. Natural Emitter Characteristics
    2. Manmade Emitter Characteristics
    3. Receptor Characteristics
    4. Communications/Information Transfer
    5. Propagation Effects
  - f. Navigation
    1. Electronic
      - a. Inertial
      - b. Radio
      - c. Satellite
    2. Non-electronic
      - a. Obstructions
      - b. Navigation Aids
      - c. Other
  - g. Imagery
3. EQUIPMENT:
  - a. Equipment Characteristics
    1. Air
    2. Land
    3. Sea
    4. Space
    5. Missiles
    6. Electronics
    7. Sensors
  - b. Equipment Performance
    1. Air
    2. Land
    3. Sea
    4. Space
    5. Missiles
    6. Electronics
    7. Sensors
4. TACTICS, TECHNIQUES, AND PROCEDURES (TTP) COGNITIVE:
  - a. Tactics
  - b. Operational
  - c. Doctrine
5. FORCE DESCRIPTION:
  - a. Army: TO&E's (Table of Organization and Equipment)
  - b. Marine Corps: TO/TE (Table of Organization/Table of Equipment)
  - c. Air Force: TA (Table of Allowances)
  - d. Navy:
    1. COSAL (Coordinated Supply Allowance List)
    2. COSBAL (Coordinated Shore Based Allowance List)
    3. NAAL (NAVSEA Ammunition Allowance List)
    4. WSF (Weapons System File)

- 5. Allowance Manpower Document
- 6. POA (Naval Air Program Operating Allowance)
- 7. AVCAL (Aviation Allowance List)
- e. Intelligence: foreign
  - 1. HUMINT (Human Intelligence)
  - 2. IMINT (Imagery Intelligence)
  - 3. MASINT (Measurement & Signature Intelligence)
  - 4. SIGINT (Signals Intelligence)
- f. Joint Forces
- g. Combined Forces
- 6. POLITICAL:
  - a. Demographics/Culture
  - b. Policy
  - c. Economics
- 7. HUMAN FACTORS:
  - a. Sensory
  - b. Perception
  - c. Physical
  - d. Cognitive
  - e. Social
  - f. Emotional
- 8. SERVICE SUPPORT:
  - a. Subcategories TBD
- 9. SCENARIO:
  - a. Army
  - b. Navy
  - c. Air Force
  - d. Marine Corps
  - e. Joint/Combined
  - f. Operations Other Than War
  - g. Peace (Planning Guidance)
  - h. Guidance, Goals, Priorities, and Objectives
- 10. TEST RESULTS:
  - a. Operational Testing
  - b. Developmental Testing
  - c. Exercise
- 11. UNIT PERFORMANCE:
  - a. Readiness
    - 1. Personnel
    - 2. Training
    - 3. Supply
    - 4. Maintenance
    - 5. Operations & Support
  - b. Historical
- 12. METADATA/STANDARDS:
  - a. Subcategories TBD
- 13. MISCELLANEOUS:
  - a. Software
  - b. Other

**7.0 NOTES FROM DATA SECURITY REQUIREMENTS TASK FORCE MEETING  
AT IDA**

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## **7.1 AGENDA**

**FRIDAY, FEBRUARY 10, 1995**

### **INTRODUCTION**

**0800 - 0830 Task Force Objectives: Ms. Teresa Lunt and Dr. Chien Huo**

### **RELEVANT TOPICS**

**0830 - 0900 Available Security Products: Mr. Darrell Sell**

**0900 - 0930 Data Releasability: CDR John Barfoot**

**0930 - 1000 TAFIM Volume on Security: Mr. Terry Mayfield**

**1000 - 1030 Break**

### **TOPICS ASSIGNED FROM PREVIOUS MEETING**

**1030 - 1100 Security Data Labeling: Mr. Mike Williams**

**1100 - 1130 Lessons Learned from NAVOCEANO's Integrated Database Management System: Ms. Eleanor Schroeder**

**1130 - 1200 CCTT Data Classification Issue: Mr. Phil Topper**

### **WRAPUP**

**1200 - 1230 Wrapup: Led by Ms. Teresa Lunt and Dr. Chien Huo**

## 7.2 ATTENDEE LIST

### DATA SECURITY REQUIREMENTS TASK FORCE MEETING AT IDA FRIDAY, FEBRUARY 10, 1995

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### 7.3 MAIN OBJECTIVES OF MEETING

The DSRTG is a forum for identifying and discussing data security issues in the M&S data community. It was organized in December 1994 as a DRTWG Task Force with the objectives to organize, analyze and translate data security issues into requirements. The issues often have a policy component and a technology component. Data security policy requirements will be presented to the DMSO Director as a starting point for working them upwards in DoD through DDR&E. The technology requirements will be addressed in the ARPA/CSTO Information Security program and testbed and shared with DoD and the security community.

The co-chairs of the DSRTF are Ms. Teresa Lunt (ARPA/CSTO) and Dr. Chien Huo (DISA/DMSO). The POCs representing the co-chairs and responsible for the running of the TF are Mr. Terry Mayfield (IDA) for Ms. Lunt and Ms. Iris Kameny (RAND) for Dr. Huo.

The specific objectives of this meeting were to follow up on the action items assigned at the previous meeting: briefs on security products (NCSC), releasability, TAFIM Volume 6 (Terry Mayfield), Component security policy (Lana McGlynn for the Army), Navy Integration Data Management System (lessons learned), standard way of labeling (Mike Williams), ways to filter and declassify data (Army/CATT).

In the future, we need to request briefings on physical security, data aggregation policy, INTELINK, and information on other Components' security policies. There was not sufficient time to schedule all of the requested briefs at this meeting.

At the previous meeting it appeared that MITRE would perform a near-term project to categorize individual M&S data systems data security requirements and suggest technology solutions and RAND would address defining the policy issues and suggested changes. Since then it was learned that the FFRDCs are unable to perform this near-term effort and the Co-chairs are looking into having the initial work done by NRL.

## 7.4 MEETING NOTES

### **Ms. Iris Kameny: Overview Brief**

The ARPA objectives in working with DMSO are (1) to use the DSRTF as a forum to match up database security technology players with M&S players and (2) to use M&S data security requirements to plan a testbed project involving real M&S users having problems and some experimental database security technology as solutions.

Data security related findings of the recent DSB Summer Study on Information Architecture for the Battlefield included recommendations for more DoD investment in classification management for data objects, data integrity (to include pedigree, currency and confidence levels for data), and data contamination recovery procedures (due to system failure, tampering, or use of inaccurate/incomplete data). The first two areas are being addressed by the DMSO DRTWG but the last one is not being currently being addressed by any DRTWG TF.

### **Ms. Teresa Lunt**

Ms. Lunt suggested to the M&S members of the DSRTF that they begin to think about participating in the testbed. Interest was shown by Ms. Janet Morrow (National Ground Intelligence Center) and Ms. Lana McGlynn (Army M&S Management Office). An important purpose of the testbed will be to establish security methodology and products (such as certified guards) that will be acceptable to the security and M&S communities. However, during the testbed process the M&S systems that are participating may have to face a near-term accreditation problem. An M&S system may not be accredited to operate under the security methods being explored in the test bed. This problem will have to be worked out for individual systems as necessary.

### **Mr. Darrell Sells: Available Security Products**

Mr. Sells gave an overview of why security is needed, risk management, and threats. He then discussed protections: better security management (e.g., enforcement of security policy), cryptography for file protection and privacy (DES, Pretty Good Privacy, Crypt (SUN)); communication protection (public key, digital signature, networks, phone lines, cable TV, satellite). Authentication and identification protection includes Fortezza using PCMCIA cards and biometrics (such as fingerprint, retina scan, etc.). He gave us a list of security/criteria guidelines, including Trusted Computer Security Evaluation Criteria (TCSEC), Trusted Network Interpretation, Trusted Database Interpretation and others from the European and Canadian communities. Applications of security include MLS DBMS products: B1 industry DBMS (Sybase, Informex, and Oracle); High Assurance B3/A1 DBMS (Lock (SCC), MUSET (MITRE) and SINTRA (NRL); and others, including Ingress Intelligent Database, Trusted Rubix B2, TRUDATA/SQLSentry (ARC), DEC SERdb, DBC/1012 (Teradata). There are three upcoming operating systems: Theta (ORA), Synergy (NSA), and TMACH (TIS) as well as evaluated products at B1 level (System 5 MLS, and Secureware), at B2 (Trusted Xenix), at B3 (XTS 300), and at A1 (GEMSOS). Network components include firewalls (Firewall toolkit (TIS), Sidewinder (SCC), Firewall 1 (sold by Sun); and others available through Mosaic and people can build their own. He included an evaluated products list for operating systems, networks, and subsystems.

Mr. Sells said that NSA is beginning to use the security products and devices inhouse to better ascertain usability or lack thereof, etc.

### **CDR John Barfoot: Foreign Disclosure**

CDR Barfoot could only speak officially on foreign disclosure of data. There is no existing policy on internal sharing/release of data within DoD except for complying with security policy. He and others that Iris Kameny spoke with in trying to set up this briefing were unaware of any

difficulties in sharing and exchanging data within DoD because there are no restrictions other than security policy. They all thought it was happening without difficulty.

CDR Barfoot went over national disclosure policy, in particular NDP-1 (1 Oct 1988), that promulgates policy and procedures, criteria and limitations, and release arrangements for eight specific information categories. There are also many policies in specific areas (such as telecommunications) that require special searching for when you need them. He gave us a short list of do's and don'ts and offered basic procedures: if a foreign country requests release of your data, your organization should forward the request to its OCA, and its OCA will determine releasability/sanitization requirements. He did caution that when you call your OCA, he/she may say determining releasability is not his/her job - so be persistent. Allen Hess says that most OCAs have failed to furnish releasability statements. There is a requirement for this, but no enforcement.

With proprietary information/products, the contractor will have to contact the Defense Technology Security Administration for permission before release to a foreign party.

CDR Barfoot said for joint information release of TADILS and USMTFs, he knows the POCs for all DoD agencies.

**Mr. Terry Mayfield: Overview of the Defense Goal Security Architecture (DGSA)  
Focusing the Direction for Securing Information Systems**

This was a very good one hour briefing on the DGSA which is documented in the TAFIM Volume 6. Mr. Mayfield began by discussing the DoD security policy statements from the DISSP SP.1, which is understood to be in coordination. It is not likely that DISSP SP.1 will be released in its entirety, rather it is more likely to end up being integrated into other DoD security policy documents, e.g., DoD 5200-1-R and DoDD 5200.28:

DoD information systems must: [REQUIREMENTS WERE DERIVED FROM DOD CUSTOMERS.]

Be sufficiently protected to allow connectivity via common carrier (public) communication systems [MAJOR CHANGE IN DOD PERSPECTIVE]

Be sufficiently protected to allow distributed information processing among multiple hosts on multiple networks in accordance with open systems architecture.

Support information processing under multiple security policies of arbitrary complexity, including those for sensitive unclassified information and multiple categories of classified information.

Support distributed information processing among users employing resources with varying degrees of security protections, including users of non-secure resources if a particular mission so dictates.

The underlying principle of the DGSA is that the missions of the enterprise provide the architectural foundation for information system security requirements and for system property cost-benefit trade-offs. Architectures provide a means to think about something before building it. He showed a flow diagram of the information security engineering process moving from DoD mission definition to system and component acquisition and accreditation.

The DGSA fundamentals: the DGSA specifies security principles and target security capabilities that must exist in future DoD information systems; it doesn't specify any particular information system or component; it is an integral part of the TAFIM; and it provides a generic "security roadmap" for system security architects. The fundamental logical concepts defined for the

DGSA are: information domains, strict isolation, security context, security association, security management, absolute protection, and uniform accreditation. [These are all defined in the briefing charts.]

The definition of "information domain" as a set of identified users and their information objects uniquely bound by a security policy, is the basis for the DGSA. A "security context" is the collection of all hardware/software resources needed to support an end user or system function operating in a particular information domain in accordance with a specific domain security policy. A "security association" is the set of all information system resources employed to securely link two distinct security contexts on different end systems supporting the same information domain. Security management objects supporting a particular information domain are contained in a logical repository called a Security Management Information Base (SMIB). Security management information must be in a protected domain. Security management information domains contain privileged end users, security management information objects and a security policy. A single security management domain can address multiple distributed information domains.

DGSA security services include: identification and authentication, access control, data integrity, data confidentiality, non-repudiation, and availability. DGSA provides more effective mission support and user capabilities by adopting a mission-oriented view; structure and guidance for security in open systems, including interoperability requirement; definition and structure for security management in information systems and a basis for evolvable and consistent security evaluation and accreditation of components and systems.

Mr. Mayfield said that the DISA/JIEO/CISS organization that developed DGSA has now been reorganized. The DISA D3 Operations now has a new IW organization and most of the CISS people went there. The architecture and engineering organization responsible for the DGSA has been retained in JIEO. The core team for transitioning to DGSA will be composed of people from DISA, NSA, FFRDCs and a set of Defense Contractors. There is a DGSA transition plan, a set of research priorities (including information domains, key management in distributed system, efficient security management, and object oriented technologies); and near term challenges.

An important question for the M&S community is the scope of information domains and how to handle the sharing relationships (i.e., policy) between distinct information domains if, for example in a DIS exercise, one is interoperating across models from different Components using data from many different sources.

#### **Mr. Mike Williams: Security Data Labeling**

Mr. Williams discussed a new standard that can address this problem. It is MIL-STD-2045-48501, Military Standard Common Security Label (CSL) 25 January 1995. (Much of this information was supplied to Mr. Williams by Dr. Tom Bartee of IDA and NSA sponsors.) The scope of the CSL includes the intelligence community and DoD, others (DOJ, DEA, NIST) provided inputs and others, including DOE and DOS, may participate. CSL is designed to work with current and developing TCP/IP or OSI communication systems. It is consistent with standards for encryption and guard protocol labeling. Its communication format is suitable for end-system storage and display of security labels. Security policies and procedures are contained in CSL for interconnecting to system high nets or nodes, TCP/IP error control codes and procedures, etc. Future trusted systems may have a different approach than current systems, but will be consistent with CSL.

**Terry Mayfield has added the following comment as a result of reviewing these notes:**  
THE CSL WILL NOT REMAIN VALID ONCE SYSTEMS BECOME "DGSA CONSISTENT" SINCE THE CSL IS OPERATING AT THE ROUTER LEVEL AND THE DGSA DOES NOT IMPOSE SECURITY REQUIREMENTS AT THE ROUTER LEVEL. THE IDEAS BEHIND

CSL MAY BE USEFUL IN THE DEVELOPMENT OF FUTURE SECURITY ASSOCIATION MECHANISMS, BUT THAT REMAINS TO BE SEEN.

CSL is real and in operation, works with current TCP/IP systems, is being used in many new military systems, and is being supplied by many contractors.

The CSL is a Protocol Data Unit (PDU) in a TCP/IP or OSI packet that provides a Domain of Interpretation identifier (DOI id) and zero or more tags. The CSL consists of a CSL header (set aside by OSI), followed by an octet of length, followed by 4 octets of the DOI id (which can contain standard domain ids already defined by DISA), followed by a number of tag label bits interpretable within the DOI. Most complexities of compartments, categories, hierarchies/levels, and release markings can be expressed in the four pre-defined tag types. CSL provides for unlabeled inputs and procedures for labeling them before output. Some distribution and/or handling caveats (e.g., FOUO, NOFORN) may require approaches to be exemplified in the handbook. Some new programs may require new DOIs (to be registered with DISA for a unique id#) and/or new tag types. CSL specifies format, processing and procedures for CSL generally, and for Mandatory Access Control (MAC) and Release Marking Security Policy (it requires MAC/ Release enforcement at Network Layer 3/router level) but the CSL does not specify trust/assurance or trustworthiness of labels.

Mr. Williams' summary recommends that M&S labeling efforts should exploit CSL in COTS buys, retrofits, and developments. He notes that while CSL is mainly a communication standard, it could be adopted at the interface to all old unlabeled input/outputs, storage media and displays. One could also consider CSL format for external representation in trusted systems that already have internal label conventions.

Mr. Williams gave us a copy of MIL-STD-2045-48501. Anyone desiring a copy of this document should contact Dr. Chien Huo at DMSO.

#### **Ms. Eleanor Schroeder: Navoceanos Integrated Database Management System Lessons Learned: Security**

The Naval Oceanographic Office, located at Stennis Space Center in Mississippi, is a third echelon command reporting to the Commander, Naval Meteorology and Oceanography Command, who in turn reports to the Chief of Naval Operations (OP-096). NAVOCEANO has a global mission for collection, processing, and dissemination of oceanographic and MC&G environmental products. Specifically, its mission is to provide specialized and unique oceanographic support to unified/specified commands in a manner and timeframe that allows them to meet their warfighting objectives. This product-oriented mission drives the Production Modernization Initiative (PMI) and is the basis for use of the Integrated Database Management System (IDBMS). The PMI/IDBMS approach is driven by the need for a practical means to view the ocean environment as a fully integrated 4-D cube (three spatial dimensions plus time). Over the intermediate to long-range planning interval, this capability supports integration of the various ocean data sets for visualization, analysis, and decision support.

The development of the IDBMS was not an easy process. The original plans called for a single relational database that would contain all of the various ocean and MC&G data sets and products that resided at NAVOCEANO. This would have required a huge amount of disk storage as well as a multi-level secure operating system with a trusted database. The primary prohibitive factor that redesigned the concept was the cost of disk storage at the time (early 80s). Since the system was not expected to be "on-line" until the mid to late 80s, it was anticipated an MLS operating system and trusted database would be available. The system was redesigned to become more of a distributed database system. Its supporting software would include an MLS operating system, a Trusted Computing Base (TCB), a relational DBMS, and common production tools. A multi-user capability supported by centralized data ingest, storage, management, cataloging, product generation, and archive functions would be provided. Users would access IDBMS by logging in

via the TCB for their particular information system. The TCB would determine the user's access to both data and services based on need-to-know and security access. A windowing environment would allow users to select data and application programs in order to process data. It should be noted that at this point no set hardware was selected for the TCB machinery. It was hoped that all hardware would interact efficiently, which of course turned out not to be the case. Hardware ranged from IBM-compatible PCs to Macintoshes, from PDP-11s to VAX 750s to HPs, Suns, Silicon Graphics, Harris, Intergraph, and Evans and Sutherland workstations. An eventual decision was made to utilize an Intergraph or a Sun workstation since all information systems owned at least one of these. This eventually evolved to a Sun workstation due to compatibility issues.

Three information systems were initially selected to participate in phase I of the IDBMS. The systems were chosen due to the fact that they interacted with each other and were of multiple security levels. All information systems had been going through "interviews" by this point to develop functional decompositions, determine transition both internally and externally, and to develop security models. Contracts were awarded and the real system design began. By this time it was the early 90s. As time progressed, it was determined that no production version of an MLS operating system would be available at the expected time of implementation. This was cause for much discussion on what direction the IDBMS would end up taking. The eventual "solution" was to temporarily scrap the multi-level security concept and to create two separate IDBMS - a classified one and an unclassified one. This definitely defeated the purpose for which IDBMS was intended, but the technology was just not there. SunOS CMW was in Beta release. A final production release was expected by early 1994. Similarly Trusted Oracle 7 was in Beta release; its production version was expected by March 1994. It was decided to go with these software systems based on the fact that the contractor would be working closely with each of the vendors to resolve problems that may occur with the Beta versions. Security labeling was waived as a requirement due to the delayed availability of a reliably functional trusted operating system. Row labeling would occur with the relational DBMS tables. Although this was not a final solution, it was felt that this would "pave the way" for a future upgrade to a B1 level system. To throw another kink into the works, a massive reorganization occurred within the office. Prior to this reorganization, departments and divisions were pretty much in sync with the information system they represented. For example, there were acoustics divisions to deal with acoustics data, gravity divisions to deal with gravimetric data, etc. The reorganization aligned the departments and division within functional lines. There were now divisions dealing with data collection, data evaluation, product generation, etc. Thus an information system that dealt with oceanographic data that once was geographically located in one part of a building would now be found spread throughout a building or even in some cases throughout several buildings. Thus additional cabling was necessary in order to keep the TCBs tied to the various information system machines. This problem is still being worked out - TCBs may or may not now be tied to a specific information system. This causes some headaches for the system managers and administrators as well as the ADPSSOs, but it is believed that it will eventually work out. Security documents have been generated to aid in implementing security requirements and procedures. A PMI Informal Security Model was developed for the integration of security procedures employed by this office to fulfill the requirements defined in the PMI Security Policy, the PMI System Specification and DoD-5200.28-STD. The PMI Security Policy is a statement of intent with regard to control over, access to, and dissemination of information processed by NAVOCEANO information systems participating in PMI and reflects the laws, regulations, and general policies from which the PMI security policy is derived. Other overreaching documents exist for the activity that deal with general computer security and networking security.

The lessons learned? Most are obvious. In designing a system, do a lot of research to determine what is available technology-wise and what will be available within a reasonable period of time. Design your system to be flexible. Ensure your performance and storage "requirements" are reasonable. In the case of IDBMS, the early design was developed by a room full of scientists who were asked what kind of system they desired. The obvious answer after years of working on

a UNIVAC, was unlimited storage space, enough memory to ensure negligible paging, nearly instantaneous response times, total interconnectivity regardless of platforms, and whatever software they wanted. It was a rude awakening when the system that evolved did not meet most of their expectations. The most important factor though with security issues is that of the human factor. Most field organizations have their own security manuals and policies that are tailored from the DoD standards to fit their specific needs. The reason behind this is that the DoD level standards are usually very general guidelines. Releasability and need-to-know issues are usually not addressed at that level and are left to the lower levels to determine. No security officer is willing to take full responsibility for another employee's actions in the field of security issues, particularly data security issues. Thus the security person will interpret the guidelines in such a way that he/she is protected. Until the DoD level creates a more stringent set of rules to which field organizations can adhere with little or, preferably, no interpretation needed, releasability and need-to-know will always be an issue when dealing with DoD data.

**Mr. Phil Topper: Generic Vulnerability Data for Close Combat Tactical Trainers (CCTT)**

The CCTT is a simulation system wherein various simulated elements replicating actual combat vehicles, weapon systems, and command and control elements are networked for real-time, fully interactive collective task training on computer generated terrain.

The Army needs to build training systems that use unclassified data for cost reasons but the data must be of high enough quality so that its use will not cause negative training. CCTT is using standard Army methodologies, doctrine, etc. Their data files must be structured the same as the classified database structures. The mindset is to train with unclassified data but in a real situation to be able to replace unclassified data with classified data without a problem.

Everywhere CCTT went for data they found it was classified. A big issue was how to support PM CATT in getting unclassified data. This is a discussion of how classified weapon performance data was changed into generic vulnerability data for use in CCTT. CCTT requires data in the following categories: target acquisition; delivery accuracy; vulnerability (direct fire, indirect fire, and mines); combat damaged components and repair times; and personnel casualties. It was determined that the data is classified because it represents specific weapon/target specification. If the data is averaged over weapons and targets then it can be unclassified. So long as there is no way to infer or relate a specific weapon to a specific target and conditions it will work. In the cases where there are a limited number of vehicles of a specific kind, this could be a problem because of statistical inferencing.

Mr. Topper outlined the generic process for developing unclassified, generic, vulnerability data for armored systems:

- Identify list of blue forces and opposing forces platforms and munitions
- Develop vehicle vulnerability classification scheme based on degree of armor protection and ammunition location and storage
- Develop broad-based munitions classes based on size, type and performance
- Develop criteria to smooth classified probability hit/kill files using view averaging techniques and weapon system dispersion
- Develop criteria to define overmatching vs undermatching for rounds vs targets
- Construct IUA files
- Check overmatching files to ensure opposing forces vs blue forces munition target values for K kills are not representative of actual capability. Adjust, if necessary based on opposing forces values. This problem occurs when the vehicle set is small and represents US vehicles only

The data underwent a pretty thorough scrub allowing AMSAA to provide the data directly to CATT. This is not following general Army policy but is determined through management review decisions that support AMSAA's being responsive to requests for unclassified data.

Questions were asked about the criteria developed allowing the change of classified to unclassified. Could they go back and come up with formally stated criteria for allowing the label change? Mr. Topper said no, this is not a standard approach but is done on a case by case basis. It results in making the data available and "no one going to jail" for doing so. However, they are documenting all the approaches they have considered and taken and have an internal audit trail of what has been done.

They are now looking at affects against high performance fixed wing aircraft and rotating wing aircraft and have been provided large amount of information on specific systems.

It was noted that the Intelligence Community has done a 180 degree turn with respect to supplying unclassified data to operational users.



## 7.5 WRAPUP

There was little time for wrapup. The next meeting will either take place during the week of the August DRTWG meeting or sooner if there is good reason (e.g., if the security projects get underway, the ARPA testbed is better formulated, etc.). Please let Mr. Terry Mayfield and/or Ms. Iris Kameny know if you have a particular data security need that can be addressed at this forum.

### Component Security Regulations:

Ms. Janet Morrow gave Ms. Iris Kameny a one page table of contents from the FSTC Security Manual, dated 1 January 1994 showing the categories of security policy.

Ms. Lana McGlynn also gave Ms. Iris Kameny a copy of two Army regulations that address security

Army Reg 380-10, 30 December 1994, "Technology Transfer, Disclosure of Information and Contacts with Foreign Representatives "

Army Reg 380-10, 1 August 1990, "Information Systems Security "

Lana suggested, that we got corresponding documents from each of the other Components, and then have a small group review these for inconsistencies, and identify where they think policies could be improved to support M&S data requirements.

## **7.6 ACTION ITEMS**

1. Mr. Terry Mayfield/Ms. Iris Kameny: Follow up on getting briefs at next meeting on: physical security, data aggregation policy, and INTELINK. There was not sufficient time to schedule all of the requested briefs at this meeting.
2. Dr. Chien Huo: Ask DMSO to request Component regulations on information systems security from the Component M&S offices.

## **8.0 NOTES FROM REPOSITORIES TASK FORCE MEETING AT NRAD**

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## 8.1 AGENDA

MONDAY - TUESDAY, AUGUST 15-16, 1994  
I/DB TASK GROUP M&S REPOSITORY DESIGN SESSION

MONDAY, AUGUST 15, 1994

- 0830 - 0930 Data Exchange Formats for Logical Data Models: Mr. Peter Valentine
- 0930 - 1100 Flexible work time
- 1100 - 1300 Identification of technical issues
- 1300 - 1400 Lunch
- 1400 - 1600 Discussion of MITRE Task Products: Mike Gorman
- 1600 - 1730 Open time

TUESDAY, AUGUST 16, 1994

- 0830 - 0845 Collecting Data Via Mosaic: Kelli McTigue
- 0845 - 1130 Communications options for classified repository data interchange software,  
hardware, protocols, networks:  
DIS Tom Tiernan  
Other Steve Roa
- 1130 - 1300 Lunch
- 1300 - 1430 MMI for Repositories:  
ARMS Demo Mike Stansel  
other MMIs Need volunteers
- 1430 - 1500 UTSS Updates: Jim Santangelo
- 1530 - 1600 MSIM report: Jim Augins
- 1600 - 1730 Need volunteers for presentation or open work time: Send  
potential briefs or discussion topics to Jim Augins  
augins @nosc.mil, phone: (619) 553-2673, fax: (619) 553-8221

## 8.2 ATTENDEE LIST

### I/DB TASK GROUP M&S REPOSITORY DESIGN SESSION MONDAY - TUESDAY, AUGUST 15-16, 1994

<u>NAME</u>	<u>ORG</u>	<u>FAX #</u>	<u>PHONE #</u>	<u>E-MAIL ADDRESS</u>
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Mike Gorman	MITRE/DMSO	(703) 883-6991	(703) 883-7266	mgorman@mitre.org
Luci Haddad	RCI/CCTT	(407) 658-9541	(407) 282-1451	haddadl@msis.dmsomil
Iris Kameny	RAND	(310) 393-4818	(310) 393-0411, X7174	kameny@rand.org
Pat Liggett	JPL/NASA	(818) 393-0675	(818) 393-4508	pat@sea.jpl.nasa.gov
Jim Santangelo	GPS/UTSS	(703) 271-7700	(703) 271-8586	jsantang@msis.dmsomil
Eleanor Schroeder	NAVOCEANO	(601) 688-5502	(601) 688-4639	eleanor@dmsomil
Mike Stansel	ISA/ARMS	(619) 574-8111	(619) 574-8100	
Peter Valentine	EPG/JDBE	(602) 538-4976	(602) 538-4945	valentinep@huachuca-emh17.army.mil

### **8.3 MAIN OBJECTIVE OF MEETING**

A major portion of the meeting was devoted to defining a road map to develop an M&S Information Resources Repository (IRR). This was in response to Chien Huo's urgent email before the meeting to be sure we reviewed the MITRE repository effort and gave him guidance as to how the Repository Subgroup thought that work fit into the short term effort for a prototype IRR (PIRR) and the longer term effort. We made this the major objective of the meeting.

#### 8.4 NEXT STEPS IN ANSWERING THE MAIN OBJECTIVE

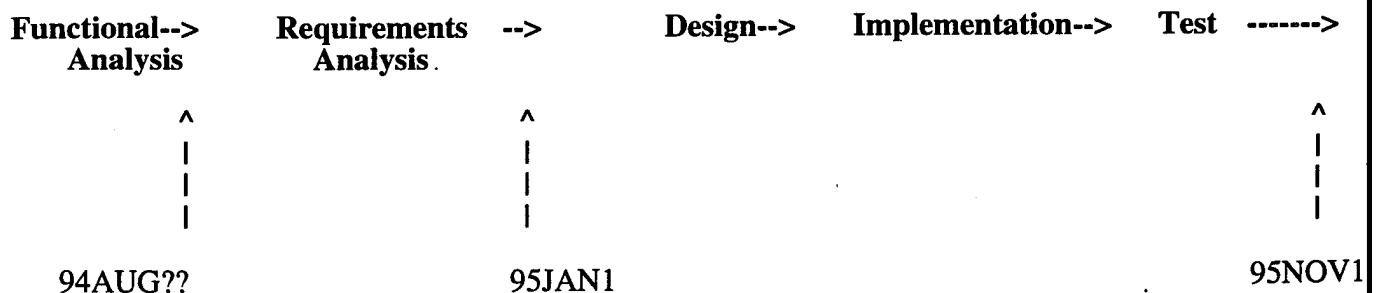
We discussed the next steps using the waterfall software process as a guideline. Essentially, we held the end point of a prototype FAd IRR constant at 96 January 1, and worked forward from Sept 94 to Jan 96.

There was disagreement among the group as to whether the requirements analysis should be for the entire long range M&S IRR or just for the prototype. The main supporter of the long range analysis was Linda Calvert. She made the point that there is a political sensitivity to developing the PIRR for the FAd since DISA would prefer we used the DDRS for the FAd IRR. Therefore, if the PIRR only addresses FAd needs without being the result of a long range requirements analysis, we may cause a big stir. However, the Group felt that because there is such a short time to get the prototype done, getting side-tracked on long term issues before we have the prototype experience could cause a big delay and more costs. We did compromise on the following: (1) put major effort into the prototype, (2) concurrently with the prototype requirements analysis effort also run a long term requirements analysis effort, and (3) have the two tasks interact so that the prototype effort doesn't do something entirely orthogonal to long term findings. (However, doing this will require more DMSO funding and there may be a conflict over sharing the best people between the two efforts.)

The Group put together an initial list of short term products we wanted from the prototype effort to aid in defining/scoping the effort. The list helped us get going by making the products and scope of effort more concrete. From this list, we went to a draft schedule and then to the list of the five functions of the PIRR that are described later:

1. M&S FAd procedures and policy support
2. Database design
3. Database support system: Administration/reports
4. Tool meta-products  
Translators/uses  
Export and Import with semantics and cost
5. TAFIM/TRM compliant platform system for PIRR
6. 8320.1.M.1 status tracking and support to meet shortcomings identified for the DDRS  
(e.g., should this be the shortcomings we have identified or only those we will address in the short term? Should we state which the PIRR will correct?)

Application Engineering Process to get to IRR Prototype:



Initial Functional Analysis:

On August 17th, we spent some time defining the initial functional requirements for the Prototype IRR (PIRR). They are:

1. Tracking of data models, complex data models, and data standards

2. Storage, reporting and maintenance of data models, complex data models, and data standards
3. Support for multiple, simultaneous users of the PIRR
4. DDRS package submittal and tracking
5. Access to DDRS information

It is recommended that additional work on defining functions be done: by using the MITRE IDEF0 process models for the FAd, DAd, and organization submitting data models and standards as soon as these are completed (MITRE) will be aided by Linda Calvert in this activity); and through discussions with Chien Huo, 8320 guidance, and Chien's view of his policies and procedures in terms of carrying out the 8320 guidance.

#### Requirements Analysis:

1. Begin with output of functional analysis, including IDEF0 models that define the concept of operation for how the M&S FAd will operate, the M&S data administrator will operate, and the M&S organization submitting standards will operate.
2. Develop alternatives to satisfying functional requirements and discuss trade offs in terms of satisfying the PIRR and long term IRR goals: TAFIM/TRM conformance, reuse of existing software. One of the alternatives to evaluate can be the DDRS.
3. End result is to define and document choice of: platform and development environment, objects, tools and standards.
  - Draft System Requirements document: 15 NOV 94
  - System Development Plan: 1 JAN 95

#### Design, Implementation, and Test:

Accurate planning for the design, implementation and test phases are dependent on the development environment. All effort should be made to reuse available software tools and do as little original implementation as possible. Mike Gorman suggested seriously looking at use of Oracle and the Oracle CASE tools to accomplish this.

#### Availability of staff and Level of Effort:

Level of effort: The group estimated 24 technical months of effort are required to perform the PIRR requirements analysis. It should begin no later than 1 September 94 to meet the 1 Jan. 96 delivery.

#### Availability of staff (assuming DMSO pays for them):

Luci Haddad (RCI support of CCTT, Orlando FL) could participate fully

Eleanor Schroeder (NAVOCEANO, Miss.) will check ability to participate equivalent of two months

Tony Rhodes and Lori Lindholm (UTSS program support, Washington) would be available fulltime

Peter Valentine (JDBE, Ft Huachuca) would be available 1/3 time

Linda Calvert, Steve Miller, Ron Farkas (SRA, Washington) would be available fulltime.  
Linda would be available to run the effort

Jim Augins (support for ARMS, San Diego) would be available 1/2 time



Mike Dabose (support for ARMS) offered to run the effort on a parttime basis because he realizes the importance of it

We thought at least three face-to-face meetings would be needed. Since at least the SRA and UTSS people are in the Washington area, Iris suggested it might be desirable to center the project there with additional support from Augins, Valentine, Haddad, and Schroeder (since they all bring unique expertise to the effort). In addition, we should consider Mike Dabose's offer to run the project since he is government. Both Dabose and Calvert have had experience running projects.

## 8.5 ACTION ITEMS

### Issues:

1. Linda Calvert will coordinate with Chien Huo Wednesday afternoon on the outcome of this meeting and by August 22-23 there should be an identified focal point for the PIRR effort.
2. Name of system: Architecture vs system vs facility vs requirement or? Group agreed on calling it the M&S Information Resources Repository, either MSIRR or M&S IRR. Chien Huo should make decision.
3. Repository taxonomy
  - a. platform (components)
  - b. objects
  - c. tools
  - d. applicationsGroup needs to extend this and to organize it into a better taxonomy (see Valentine's initial attempt in Appendix C)
4. Repository group: Address audit trail and tagging data and work with Data VV&C TF on these issues

### People Assignments:

#### Jim Augins

1. With Valentine continue to identify different file formats toward deciding on defacto formats for exchanging different types of objects within group
2. Send Valentine information on data modeling tools being used

#### Linda Calvert

1. If the PIRR effort is supported by DMSO, then the timeline needs to be put into the DASP
2. Changes to activity lists for FDAd needs to be sent to Mike Gorman by close of business August 24, 1994

#### Mike Gorman

1. Work with Valentine on deficiencies of DDRS asap
2. MITRE develop IDEF0 processes for M&S FDAd, DAd, and M&S organization submitting standards to the M&S FDAd (Linda Calvert will help). For FDAd functionality and possible reuse, review:
  - a. DDRS
  - b. Army standards process application at AMSMO, contact Lana McGlynn 703-607-3384
  - c. Army Standards process, contact Jim Glymph 703-806-3858
  - d. Navy standards process contact Gregg Michaels 703-506-5811 and Rebecca Wade (Navy CDAd)
3. Prepare written standards update to include:
  - Data Management Services (SQL, IRDS, PCTE, ATIS, Object, data element standards)
  - Software Engineering Services (CASE Tools and Environments, Software Engineering Environment)
  - User Application Interface (API, TAFIM HCL, NIST API),
  - Distributed Computing (DCE)
  - Data modeling (IDEFIX)
  - Process modeling (IDEF0)
  - Platform standards consistent with TAFIM/TRM

- Tailoring of document standards for development
- 490 Standards: See UTSS and software standards
- 4. Comparison between Oracle and Sybase RDBMSs especially with respect to software generation
- 5. Submit the current E-R diagram and definitions as-is, don't do any more work on them
- 6. Get together descriptions of data and object oriented groups and standards
- 7. Arrange for Len Gallagher to talk to group about objects as used in SQL3 (e.g., how is part-whole addressed)
- 8. Will make copy of SQL3 available to group (on disk, ~1800 pages)

**Chien Huo**

1. Decision on name for repository system. Repository group recommends M&S Information Resources Repository (either MSIRR or IRR)
2. Redirect MITRE to do items listed above rather than continuing on current course
3. Give CONOPS for M&S FDAd draft dated 8/12/94 to Mike Gorman

**Luci Haddad**

1. Send Valentine info. on data modeling tools being used
2. Send survey to Group on software reuse repositories especially those built and used by Defense
3. Send Mike Gorman the IDEF0 process model CCTT did for 8320.1-M-1 process

**Iris Kameny**

1. Work to complete list of IRR tools, others should send input to Iris
2. Get notes of this meeting prepared asap and mailed to others
3. Send Mike Gorman copy of DCE document received from CECOM

**Jim Santangelo**

1. Send copies of UTSS Requirements document and other relevant documents to attendees
2. UTSS will be developing and evaluating alternatives for their repository selection, all of this information needs to be shared with the repository group and the PIRR requirements effort

**Peter Valentine**

1. POC for collecting data modeling tools information (especially from Haddad and Augins)
2. With Augins continue to identify different file formats toward deciding on defacto formats for exchanging different types of objects within group
3. Work with Gorman on deficiencies of DDRS asap

## **8.6 MEETING BRIEFS/DISCUSSIONS**

### **8.6.1 OPENING DISCUSSION ON OBJECTS AND STANDARDS: MOSTLY MIKE GORMAN**

The meeting began with a discussion of standards especially object-oriented standards, with the group deciding they didn't know what the various object-oriented standards groups were or how their missions differed.

The following information was supplied by Jim Augins by email after the meeting:

**ODMG:** Object Data Management Group is a consortium of ODBMS vendors broadly analogous to its relational counterpart, the SQL/Open consortium. This group published the ODMG-93 standard for ODBMS and agreed to implement it in 18 months. This group is not part of OMG.

**ODBC:** Open Database Connectivity is Microsoft's open interface for accessing data in a heterogeneous environment of relational and nonrelational database management systems. ODBC is vendor neutral and is "middleware." It allows a client to access DBMS servers without having that server vendor's client software. It allows the software developer to develop an interface to a ODBC module that can talk to COTS drivers for multiple DBMS vendor's servers. It is becoming a defacto standard and is becoming increasingly available for Unix platforms.

**perl and DBperl:** Perl is an interpreted language with powerful string, scalar, and array processing features developed by Larry Wall that "nicely bridges the functionality gap between sh (1) and C." Since relational DB operations are typically textually oriented, perl is particularly well-suited to manage the data flows. The C source code, which is available free of charge and runs on many platforms, contains a user-defined function entry point that permits a developer to extend the basic function set of the language. The DBperl Group seeks to exploit this capability by creating a standardized set of perl function extensions (e.g. `db_fetch()`, `db_attach()`) based on the SQL model for manipulating a relational DB, thus providing a portable perl interface to a variety of popular RDMS engines, including Sybase, Oracle, Ingres, Informix, and Interbase. In theory, any DB engine that implements a dynamic SQL interpreter in its HLI can be bolted onto the perl front end with predictable results, although at this time backends exist only for the aforementioned five DB engines.

(More information about perl and DBperl can be found in Appendix D).

Mike Gorman outlined the languages and object oriented standards groups as shown below:

STANDARDS GROUP	PURPOSE/DESCRIPTION
--------------------	---------------------

ANSI/ISO Object Groups

X3H2	DB languages committee; includes defining all interfaces to persistent data (including objects). Sometimes referred to as the SQL Committee. By 1994 expect single valued columns, by 1997 ADTs within a column (methods). The Federal Govt is not participating in defining this standard except for NIST. Expect to find products utilizing SQL3 by 2001-2002. There should be a Call Level Interface CLI/SQL2 1996 standard to support the API concept. One person from Microsoft is in charge of developing the CLI standard.
X3H7	Coordinating all object-oriented language development with ANSI committees
X3J4	COBOL
X3J3	Fortran
X3J9	Pascal
X3??	C
X3??	C++

NON ANSI/ISO OBJECT GROUPS

OMG	Object Management Group: CORBA (Common Object Request Broker Agent)
SQL/ACCESS	
ODBC	Object Database consortium originally developed by Microsoft and now incorporated in PC calls
DCE	Distributed Computer Environment, Remote Data Access standard. Private organization of vendors.

## 8.6.2 REPOSITORY DATA INFORMATION MODELING DATA: PETER VALENTINE

Peter's brief is attached in Appendix A along with additions agreed to by group.

Peter began by saying there are two kinds of repositories: (1) those storing metadata and (2) warehouses for instance data. The Group preferred thinking in terms of two types of data: Metadata and instance data since a warehouse repository may also have metadata about the warehouse data. It is difficult to come up with a good definition of metadata as distinct from instance data. The IEEE Metadata WG has been having a hard time going so as has everyone else--so the group did not waste much time on this.

We had some discussion of the CDIF PCTE repository standard. Linda Calvert handed out a paper on it and said that Steven Miller at RSA would call Peter to give him more information. Linda's thought was that the repository group might be able to leverage the CDIF subject areas in deciding on the taxonomy for the repository.

Some additional notes on Peter's brief:

INQUISIX: for taxonomies for domain analysis was developed by Software Productivity Solutions in Melbourne Florida; they have a contract with Rome Labs

DoD reuse repositories: ASSETS and CARDS were both ARPA funded developments and could be used as repositories for data, algorithms and M&S. But it was pointed out that these repositories manage their assets at an object or container level. They are not able to get inside the object or container and access components. The Defense Software Reuse System (DSRS) is another reuse repository as is the Army reuse repository. There may be some lessons to be learned and to be borrowed from these efforts since the M&S IRR includes software reuse. Luci Haddad suggested taking a good look at these and she will gather information and review these for the group.

#### Security Issues:

- Poly-instantiated data: copies of the same data item may be labeled at different security levels. Several reasons: (1) could be due to differences in security labeling by different services, and (2) there are real examples where the source causes the security label to change (for example the same data item may have the same value but different security levels depending on whether the value came from the Intel community or from an open source such as Janes).
- We also need to consider security issues with respect to classification of metadata.
- Another security issue has to do with releasability of metadata and instance data. In fact this isn't restricted to classified data, an example was given at the last I/DB by BMDO about it taking over a year now for BMDO to try to release unclassified data to NASA
- The Data VV&C TF is addressing audit trail and tags but the repository group also needs to address these issues and work with the Data VV&C TF on these issues.

Data modeling tools: the DDRS is on an AT&T machine and the Defense Interim data repository is hosted on a VAX. Linda Calvert kept bringing up the issue that for the M&S FDAd initial repository, we may create a political problem in NOT USING the DDRS. We need to consider the DDRS as an alternative solution in our evaluation and come up with substantial reasons if we decide not to use it.

File formats: the idea of the file formats is to come up with a set of formats to use in order to exchange information among the Group members.

### **8.6.3 M&S DISTRIBUTED INFORMATION RESOURCES REPOSITORY (IRR) TAXONOMY: IRIS KAMENY**

Iris Kameny put together a two page list of four areas that need to be addressed for the IRR. They are: open systems platform, objects to be managed, tools and applications. She also showed five example types of M&S IRRs and what she would expect to be found in each of the repositories: (1) repository for use by the M&S FDAd, (2) data warehouse or data center repository, (3) M&S software reuse repository, (4) M&S study director/DIS exercise director repository, and (5) M&S developer repository. The ordering is her interpretation of the importance of providing the type of repository to the M&S community. Her purpose in doing this was her view that the MITRE document has concentrated solely on (5) the M&S developer and perhaps they still did not understand that the M&S I/DB main purpose is to support the M&S area with correct, valid, timely, etc. data for the other usages.

The two page listing is in Appendix B. Peter Valentine's reorganized taxonomy of it is in Appendix C. The "objects to be managed" section provided a good framework for much of the discussion during the remainder of the meeting.

#### **8.6.4 DISCUSSION OF MITRE TASK PRODUCTS: MIKE GORMAN**

The Repository Subgroup had several comments to make about the MITRE draft document "Modelling and Simulation Repository Facility" dated 12 August 1994:

1. There was an objection to the name "Modelling and Simulation Repository Facility" which was described in the issues section of these notes
2. The main body was presented in chart format (without annotations) and there were discussions about several of the charts as being incorrect, missing the point, misleading, etc. These include:
  - a. The chart of the repository metamodels and M&S, repository data and repository directory: this probably captures the best example of omission and misunderstanding since it doesn't even mention data standards or the data standardization process, etc.
  - b. The chart showing the M&S repository community network with DMSO at the center was judged misleading unless it was stated that this was a view of relationships for entering M&S data standards. Other points were that there can be multiple repositories in each service, and the service repositories can talk to each other directly across services (don't have to go through DMSO).
  - c. The next chart with DIRS at the center should have DDRS at the center and should refer to other functional areas as "functional areas" such as C2 and Intelligence

The discussion went from there to the IDEF1X diagram which confused the group because it seems to be (and Mike Gorman agreed) a data model of an M&S Directory. This was not a project deliverable since we already have a data model of the M&S Directory agreed to by the community and a copy of that and the Database Directory data model were given to MITRE a number of months ago. Gorman then said that the data model could be interpreted as a two step removed more detailed model of the objects listed in Appendix B but most of the group had a problem understanding this explanation.

The main problem with the MITRE effort was that somehow they had gotten diverted from serving the goal of the data suppliers and supporters to M&S and had instead concentrated on Modeling and Simulation. So there is no mention of the most important objects that need to be managed by the prototype repository for the M&S FDA nor of the relationships of those objects to each other and to the tools that might reside in the repository.

The Repository Subgroups recommendation is, given the limited time remaining for the MITRE task, that they concentrate on those well defined tasks enumerated under Mike Gorman's name in ACTION ITEMS.

#### **8.6.5 TECHNICAL ARCHITECTURE FRAMEWORK FOR INFORMATION MANAGEMENT (TAFIM): KEN KAUFMAN**

This brief was to discuss the TAFIM, Navy use of the TAFIM, and some problems. The briefing addresses a particular Navy architecture problem for the Data Link Processing and Control System (DLPCS) Goal Architecture which needs to support reliable multicasting.

The TAFIM and the Technical Reference Model (TRM) which is part of the TAFIM calls for use of open systems and COTS products. Its purpose is to provide vendor independent choice of products and reduce life cycle costs of DoD projects.

The TAFIM provides a framework for Life Cycle Development and for levels of integration (DoD, mission, function, application and personal). It provides for simultaneous integration processes that will provide a best of breed solution and for different views of a model. This brief presents a top-down view of the DLPCS goal as TAFIM compliant and an evolutionary view (bottom-up) of C2P and LEDS. The reality will be something between the two based on cost, user needs and time constraints.

Ken showed that the two views would result in a final product that would meet the TAFIM within reasonable technical and programmatic integration constraints. The initial focus was largely on the development of models using functional areas and activity perspectives to achieve the TAFIM goals. This reduced the need to develop new applications, data and technical infrastructure. As the bottom up view is developed, new cross-functional integration and interoperability will be possible. Future implementations would be possible with off-the-shelf applications developed by other TAFIM programs. Those programs also benefit from the DLPCS applications being available for integration within their products. He was concerned over the lack of a requirement for an API between the mission applications/architecture and the next layer down, the support application layer.

#### **8.6.6 SECURITY OVER INTERNET**

This was a brief by Joan McCaffrey of Mc Info. (6219-942-4164) about a 3COM Access Builder remote access server that will support some access control features for remote users using dial-up connections to the enterprise network. It could achieve secure communications if used in conjunction with a STU3 encryption modem. The box serves as a router for IP and other network systems. Access control includes password protection, automatic callback, logging of unauthorized attempts and reporting of those to a management station. It also has a resource access manager that insulates individual network segments running mission-critical applications. "In addition, special security software can interact directly with network-based security servers and security software located on client nodes. This software provides a standards-based security model that supports OSF/DCE security server today, and will be compatible with a broader set of security systems in the future." (OSF/DCE is Open Systems Foundation/Distributed Computing Environment) The router can dial into another LAN for a direct LAN to LAN connection. Instead of using the ports for single interfaces, it can use them all for inverse multiplexing, thereby increasing the communication bandwidth.

#### **8.6.7 ARMS DEMONSTRATION: MIKE STANSEL**

The ARMS Demonstration included the Oracle/SuperCard GUI proof of concept V 1.6 and the complete 4th Dimension repository for data analysis and the ARMS Model Interface (AMI). AMI currently provides ability to build major scenarios within hours rather than weeks, and automatically loads data to the ITEM model. ARMS Version 2.0 is under development. High points included:

ARMS 2.0 will be Platform independent! Original source code can be compiled on platform of choice (SUN, HP TAC III, Macintosh, PC Windows/OS2).

ARMS currently contains MOE's in addition to physical characteristics of platforms and systems.

ARMS V 2.0 will provide browsing capability to other databases or repositories.

ARMS V 2.0 will support Client/Server architecture.

Source tagging by data element (Classification/Source/Date).



Multiple sources for each data element.

User can add own data without changing core data.

Notes can be attached to archive of a scenario; scenario can be reloaded to the model at a later time for further analysis of data and changing of sources.

ARMS provides an existing system capability that has a well accepted, logical and easy to use interface. Its structure provides a means to see data associated with any country, identified to branch of service and mission areas. The structure also allows users to see data for each element from different or multiple sources. Data for joint service support is being expanded based on the needs of the users.

#### **8.6.8 SIMULATION AND HUMAN SYSTEMS TECHNOLOGY DIVISION: KEVIN BONER**

This work is being done for ARPA as part of the simulation infrastructure and will support STOW-E. It is part of an effort to link constructive, live and virtual simulations. The future DISI with robust multicasting may use the DIS encapsulated stream protocol. In the long run, DIS will be IP compatible. Industry is now looking at streams and there may soon be a commercial stream standard and products implementing the standard.

Question was asked about how to supply data to DIS before an exercise. The suggestion was that DIS nodes had an IP port that could be used but that all the simulators are tied to the stream port. It would seem that data to be used in an exercise would be sent to a DIS repository managed by the exercise developer and from there it would be distributed to the various simulators. The way out-of-band data is handled in STOW-E (data collected during the exercise) is by FTP at specific times such as early morning and late at night when it will not interfere with the exercise.

The briefing showed how the existing BBS network is interfaced to the existing SIMNET network, how the first phase of live would be handled, algorithms for supporting large numbers of players on the DISI, the DISI Red connection, and interconnecting CMTC-IS Hohenfels and BBS Hohenfels and Simnet at Grapenwoehr for STOW-E.

#### **8.6.9 UTSS BRIEF: JIM SANTANGELO**

Jim gave us an update on UTSS with special emphasis on products they have produced that might be of help to the Repository Subgroup. These include:

- User needs assessment

- Technology Evaluation: COTS and GOTS hardware and software, including platforms and DBMSs

- Cost Constraints

- Policies and Procedures Constraints Report

- Preliminary Concept of Operations

- Requirements Analysis

- System Engineering Management Plan (SEMP)

- Systems Engineering Analysis (includes identifying reusable software)

- System Specification (in progress)

UTSS will share their documentation and lessons learned with the Repository Subgroup.

**8.6.10 FINAL REMARKS: JIM AUGINS**

One of the objectives of this meeting that wasn't addressed was how to interconnect the existing M&S data centers. That will need to be put off until another day.

## 8.7 APPENDICES

### APPENDIX A: REPOSITORY DATA INFORMATION MODELING DATA: PETER VALENTINE

Pete's viewgraphs have been repeated below with changes/additions/notes made during the session.

#### Repository Data Information Modeling Data

- Model Characteristics
  - E/R data (entities, attributes, relationships, cardinality, domains and category clusters)
  - Vendor value-added data (rules, defaults, triggers, declarative, referential integrity, etc.)
- Mappings
  - Inter/Intra Model
  - 8320.X standards
  - Physical to logical
- 8320 Standards
  - Standard data element naming
  - Proponency and responsibility
  - Submission Cycle and Status
  - Security (ADDED)
  - Releasability (ADDED)

#### Repository Data Instance Data Tagging

- Security
  - Multi-level-security (MLS)
  - Security tagging (field, row (ADDED), table and database levels)
  - Multi-Service regulation conflicts (Service High?)
  - Poly-instantiated databases
  - Downgrading (ADDED)
- Audit Trail (ADDED: ADDRESSED BY VV&C TF BUT NEED TO CONSIDER FOR REPOSITORY ALSO)
  - Data source
  - Modification history
  - Registered data producers
- Tagging formats
  - Bit-level ANDs
  - Multiple, modular tagging packages
- Releasability (ADDED)
- Performance (ADDED)

### Communication Protocols for use by the Repository Subgroup

(Pete asked for show of hands as to which Repository Subgroup attendees had which capabilities, "client" implies the person has the service available, "server" implies the person's organization can act as a server)

PROTOCOL	#CLIENTS	#SERVERS
Internet E-Mail	9	1
Compuserve E-Mail	2	-
FTP	8	1
Gopher	9	3
World-Wide-Web	8	4
Dial-Up Bulletin Board	5	1
Telnet	8	1
perlDB (access to DB over)		
Internet (ADDED)		

### Data Modeling Tools

(reflects what tools the M&S data modeling community is using) (ADDED)  
(all words on righthand side of colon were added by note taker):

- ER/WIN (ERX and DBF): blessed by M&S FdAd
- BF/WIN (ADDED)
- Leverage: used in DoD Interim repository
- IE Advantage: being used by CIM
- WIZDOM: IDEF1X tool being used by CCTT
- KBSI: T&E community is using it; used to support IDEF3 modeling (process modeling with activation)
- System Architect: joint Navy/AF for Air Tasking Order (ADDED)
- Protosoft: the new Naval Simulation System (ADDED)
- Reuse Library Framework (RLF) used for taxonomy modeling (Unix env) (ADDED)
- INQUISIX: used for taxonomy modeling (Unix env.) (ADDED)
- Sterling: meta model capability language (ADDED)

### File Formats

(We agreed this could be of indeterminable length and needs to be restricted to those we might be interested in using to exchange repository information)

ER1	ER/WIN native format
ERX	ER/WIN ASCII Export format
DDL	Data definition language (SQL)
TXT	ASCII text file (MS-DOS)
ASC	ASCII text file (Unix)
SML	Structured Modeling Language
DOC	MS-Word (Windows)
RTF	Rich Text Format (ASCII exchange format)
PS	Post-Script document
EPS	Encapsulated Post-Script (single graphic)
ZIP	ZIP Compression format
Z	Unix compression
ARC	ARC compression
HQX	MAC??
WP5	Word Perfect 5.x document
DBF	dBase File (version 3 or 4)

Note: Need to compile a database of file formats and viewers

#### DDRS Insufficiencies

- Cannot address complex data used by DoD acceleration guidance
- Requires mandatory data not available to end users (EXPLANATION: SOME MANDATORY METADATA CONSISTS OF CODES TO BE FILLED IN BY FDADS)
- Not widely or easily available to majority of DoD
- Cannot store data models and is not model based
- Data elements are not mapped to data models, no integrity enforcement
- No export facility - users cannot review data off-line
- Documentation out-of-date with current tool
- User interface is user-hostile and slow

#### Additional from discussion:

- No directory to instance databases
- No link to DSRS
- No usage metadata
- Data elements have been entered without being modeled in a data model
- Doesn't capture business rules

## APPENDIX B: M&S INFORMATION RESOURCES REPOSITORY (IRR) LIST: IRIS KAMENY

Note that this was a quick dump of the types of things to consider in developing a repository: platform, objects, tools to manage and use objects and repository, applications to utilize objects and tools. More work is needed by the Repository Subgroup to flush these out and to better organize them. The "Y" and "O" are not meant to be definitive but representative, any repository could contain all of the items and serve multiple uses.

Where:

- (1) M&S FDAd
- (2) Data Warehouse/Center
- (3) M&S Reuse Repository
- (4) Study Director/DIS Exercise Director Repository
- (5) M&S Developer Repository

And:

- Y = yes  
O = optional  
blank = don't know or not applicable

A. OPEN SYSTEMS PLATFORM		(1)	(2)	(3)	(4)	(5)
1.	Hardware (e.g., HP, Sun)	Y	Y	Y	Y	Y
2.	Operating System (e.g., Unix, Posix)	Y	Y	Y	Y	Y
3.	DBMS (e.g., relational, object-oriented)	Y	Y	O	Y	O
4.	Human Computer Interface	Y	Y	Y	Y	Y
B. OBJECTS TO BE MANAGED						
1.	IRR directory	Y	Y	Y	Y	Y
2.	Process models (IDEF0)	O	O	O	O	O
3.	Data models (IDEF1X)	Y	Y	O		
4.	Complex data models	Y	Y	O		
5.	Data standards/ data dictionary (e.g., DDRS)	Y	Y		Y	
6.	Domain/nomenclature, symbology standards	Y	Y		Y	
7.	M&S directory	Y				
8.	Database directory	Y				
9.	Instance database(s)		Y	O	Y	O
10.	Instance database(s) schemas and dictionary		Y		Y	
11.	Mapping from instance DB schema to data standards		Y		Y	
12.	Database Quality Profile (data VV&C)		Y		Y	
13.	Standard algorithms		O	Y	Y	Y
14.	Model and Simulation software			Y	Y	Y
15.	M&S VV&A documentation			Y	Y	Y
16.	Authoritative Data Sources directory	Y				
C. TOOLS						
1.	Directory tools (i.e., IRR, database, M&S Authoritative Data Sources)	Y				
2.	IDEF0 tool	Y	O	O	O	
3.	IDEF1X tool	Y	Y			

		(1)	(2)	(3)	(4)	(5)
4.	Complex data modeling tool(s)	Y	Y			
5.	Data dictionary tools	Y	Y			
6.	API for DBMS	Y	Y			
7.	Mapping tool/manipulation of DB schema		Y			
8.	Data VV&C process tool (include quality profile)		Y			
9.	M&S VV&A process tool			Y	Y	Y
10.	Tool to support reverse engineering		O			
11.	Tool to support data standardization		O			
12.	Tool to link IDEF0, IDEF1X and data standards	Y	Y			
13.	Data acquisition tool		Y			
14.	Data post processing tool(s)		Y		Y	
D. APPLICATIONS						
1.	Support for M&S FDA data standards process	Y				

## **APPENDIX C: REPOSITORY OBJECT TAXONOMY: PETER VALENTINE**

### **I. Data**

Instance Data Sets, these data sets would share a common need for configuration management to include versioning, audit trail, etc.

#### **A. Automated Data**

##### **1. Relational Databases**

Any data stored in relational database tables (easily imported into a repository)

##### **2. File Structures**

Complex record data structure (which would need storage as Blobs)

##### **3. Non-Relational DBMS**

Data stored in Hierarchical, Network, or Object databases

#### **B. Electronic Documentation**

Compound documents (could contain graphics, etc.) which are stored and cataloged to permit retrieval by users of the repository

##### **1. Standards documents**

Compound documents cataloged and stored for use by M&S community

##### **2. System documentation**

Compound documents which describe legacy/existing systems (data providers)

#### **C. Non-Automated Data**

Hardcopy or physical records (maps, books, etc.)

### **II. Metadata Information about the data**

#### **A. Information Modeling Data**

##### **1. IDEF1X models**

ERWin models initially

##### **2. IDEF0 models**

BPWin models initially

##### **3. Other models**

Other modeling techniques to address complex data

#### **B. Data Elements**

The data required to submit and track submissions to the DDRS

#### **C. Domain/Nomenclature Standards**

A set of standard domains and domain values (nomenclature)

#### **D. Directory Information**

Directory/catalog information about what is contained within the repository and pointers to external objects as well.

##### **1. Database Directory**

##### **2. M&S Directory**

##### **3. Authoritative Source Directory**

##### **4. IRR Directory**

#### **E. Data Quality Profile**

\*\*\*Need definition

#### **F. VV&A Documentation**

\*\*\* Need definition



G. Mappings

1. From schemas to models  
Tying existing physical databases and schemas within the repository to models
2. From models to standards  
Tying models to standard data elements

H. Instance data tagging

1. Security Level  
Tagging of instance data at the database, table, row, and field level
2. Releasability  
Release authority and POC information

I. Audit Trail Tagging

1. Data source  
Identify the source of the data, possibly using registered producer IDs
2. Modification history  
Retaining modifications, and timestamps of changes to the data

III. Software

A. Standard algorithms

Standard reusable algorithms which are commonly used by the M&S community (or the M&S data community) (possibly using some kind of formal pseudocode?)

B. Source code

Reusable code segments and complete software systems, object code?

## APPENDIX D: PERL AND DBPERL: MATERIAL FURNISHED BY JIM AUGINS

MANY DATABASE-ORIENTED EXTENSIONS TO PERL HAVE BEEN WRITTEN. BASICALLY, THESE USE THE USUB MECHANISM (SEE THE USUB/ SUBDIRECTORY) IN THE SOURCE DISTRIBUTION) TO LINK IN A DATABASE LIBRARY, ALLOWING EMBEDDED CALLS TO INFORMIX, INGRES, INTERBASE, ORACLE AND SYBASE.

HERE ARE THE AUTHORS OF THE VARIOUS EXTENSIONS:

WHAT	TARGET DB	WHO
?INFOPERL	INFORMIX	KURT ANDERSEN (KURT@HPSDID.SDD.HP.COM)
INGPERL	INGRES	TIM BUNCE (TIMBO@IG.CO.UK) AND TED LEMON
INTERPERL	INTERBASE	BUZZ MOSCHETTI (BUZZ@BEAR.COM)
ISQLPERL	INFORMIX	WILLIAM HAILS, BILL@TARDIS.CO.UK
ORAPERL	ORACLE	KEVIN STOCK (KSTOCK@ENCORE.COM)
PGPERL	POSTGRES	IGOR METZ (METZ@IAM.UNIBE.CH)
*SQLPERL	INGRES	TED LEMON (MELLON@NCD.COM)
SYBPERL	SYBASE	MICHAEL PEPPLER (MPEPPLER@ITF.CH)
UNIPERL	UNIFY 5.0	RICK WARGO (RICKERS@COE.DREXEL.EDU)

? Does this one still exist?

\* Sqlperl appears to have been subsumed by Ingperl

Buzz Moschetti\* has organized a project to create a higher level interface to will allow you to write your queries in a database-independent fashion. If this type of project interests you, send mail to <perldb-interest-request@vix.com> and asked to be placed on the "perldb-interest" mailing lists.

Here's a bit of advertising from Buzz:

Perl is an interpreted language with powerful string, scalar, and array processing features developed by Larry Wall that "nicely bridges the functionality gap between sh (1) and C." Since relational DB operations are typically textually oriented, perl is particularly well-suited to manage the data flows. The C source code, which is available free of charge and runs on many platforms, contains a user-defined function entry point that permits a developer to extend the basic function set of the language. The DBperl Group seeks to exploit this capability by creating a standardized set of perl function extensions (e.g. db\_fetch(), db\_attach()) based the SQL model for manipulating a relational DB, thus providing a portable perl interface to a variety of popular RDMS engines, including Sybase, Oracle, Ingres, Informix, and Interbase. In theory, any DB engine that implements a dynamic SQL interpreter in its HLI can be bolted onto the perl front end with predictable results, although at this time backends exist only for the aforementioned five DB engines.

The official archive for DBperl extensions is ftp.demon.co.uk: /pub/perl/db. This archive contains copies of ports for Ingres, Oracle, Sybase, Informix, Unify, Postgres, and Interbase, as well as rdb and shql; it's the home of the evolving DBperl API Specification.

There are also a number of non SQL database interfaces for perl available from ftp.demon.co.uk. These include:

Directory	Target System	Authors and notes
btreeperl	NDBM extension	John Conover (john@johncon.com)
ctreeperl	Ctree extension	John Conover (john@johncon.com)
duaperl	X.500 DUA	Eric Douglas
rdb	RDBMS	Walt Hobbs (hobbs@rand.org)
shql	SQL Engine	Bruce Momjian (root@candle.uucp)

### 1.1) What is Perl?

Perl is a compiled scripting language written by Larry Wall\*. Here's the beginning of the description from the man page: Perl is an interpreted language optimized for scanning arbitrary text files, extracting information from those text files, and printing reports based on that information. It's also a good language for many system management tasks. The language is intended to be practical (easy to use, efficient, complete) rather than beautiful (tiny, elegant, minimal). It combines (in the author's opinion, anyway) some of the best features of C, sed, awk, and sh, so people familiar with those languages should have little difficulty with it. (Language historians will also note some vestiges of csh, Pascal, and even BASIC-PLUS). Expression syntax corresponds quite closely to C expression syntax. Unlike most Unix utilities, perl does not arbitrarily limit the size of your data--if you've got the memory, perl can slurp in your whole file as a single string. Recursion is of unlimited depth. And the hash tables used by associative arrays grow as necessary to prevent degraded performance. Perl uses sophisticated pattern matching techniques to scan large amounts of data very quickly. Although optimized for scanning text, perl can also deal with binary data, and can make dbm files look like associative arrays (where dbm is available). Setuid perl scripts are safer than C programs through a dataflow tracing mechanism which prevents many stupid security holes. If you have a problem that would ordinarily use sed or awk or sh, but it exceeds their capabilities or must run a little faster, and you don't want to write the silly thing in C, then perl may be for you. There are also translators to turn your sed and awk scripts into perl scripts.

OK, enough hype.

### 1.2) What's the difference between "perl" and "Perl?"

32! [ ord('p') - ord('P') ] (Shouldn't that be 42, the Answer to the Great Question of Life, the Universe, and Everything? ;)

Larry now uses "Perl" to signify the language proper and "perl" the implementation of it, i.e. the current interpreter. Hence Tom's quip that "Nothing but perl can parse Perl."

On the other hand, the aesthetic value of casewise parallelism in "awk," "sed," and "perl" as much require the lower-case version as "C," "Pascal," and "Perl" require the upper-case version. It's also easier to type "Perl" in typeset print than to be constantly switching in Courier. :-)

In other words, it doesn't matter much, especially if all you're doing is hearing someone talk about the language; case is hard to distinguish aurally.

1.3) Has perl been ported to machine FOO?

Perl runs on virtually all Unix machines simply by following the hints file and instructions in the Configure script. This auto-configuration script allows Perl to compile on a wide variety of platforms by modifying the machine specific parts of the code. For most Unix systems, no porting is required. Try to compile Perl on your machine. If you have problems, examine the README file carefully. If all else fails, send a message to comp.lang.perl and crosspost to comp.sys.[whatever], there's probably someone out there that has already solved your problem and will be able to help you out.

Perl has been ported to many non-Unix systems. All of the following are mirrored at ftp.cis.ufl.edu:/pub/perl/src/[OS]/. The following are the (known) official distribution points. Please contact the porters directly (when possible) in case of questions on these ports. All I do is archive them, I don't know anything about them.

- \* MS-DOS binaries and source are available at ftp.ee.umanitoba.edu [130.179.8.47] in /pub/msdos/perl. There are currently half a dozen different ports for MS-DOS. BigPerl4 (v3) is perl4.036 compiled with the Watcom C/386 compiler (32-bit, flat-memory model C compiler) with the following features:
  - \* Up to 32MB of memory can be used.
  - \* Supports virtual memory.
  - \* Works under Windows 3.1 (however, a second copy of perl cannot be spawned under Windows).
  - \* The perl debugger can be used.
  - \* Contains GDBM support.
- \* Windows/NT binaries are available from ftp.cis.ufl.edu. Does anyone know the official distribution point? I got these from archive.cis.ohio-state.edu quite awhile back.
- \* Macintosh binaries and source are available from nic.switch.ch [130.59.1.40] in /software/mac/perl. Version 4.1.3 is perl4.036 compiled with the MPW C compiler
  - \* Mac\_Perl\_413\_src.sit.bin Sources
  - \* Mac\_Perl\_413\_tool.sit.bin MPW Tool
  - \* Mac\_Perl\_413\_appl.sit.bin Standalone ApplicationThere is a mailing list for discussing Macintosh Perl. Contact "mpw-perl-equest@iis.ee.ethz.ch."

Timothy Murphy\* also ported a version of perl to the Macintosh using Think C. It has probably been abandoned in favour of the MPW port, but is still available at ftp.maths.tcd.ie [134.266.81.10] in the directory /pub/Mac/perl-4.035/.

- \* OS/2 sources are also available at ftp.cis.ufl.edu in /pub/perl/src/os2. This appears to have been abandoned and added to the official distribution. See the directory os2 in the perl5 sources.
- \* VMS systems should be able to build directly from the standard distribution.

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There is much more Information at URL  
ftp://ftp.cis.ufl.edu/pub/perl/doc/faq  
Jim Augins

**APPENDIX E: BRIEFING CHARTS AVAILABLE THROUGH RUTH EAGLE  
eagle@rand.org, PHONE (310) 393-0411, X6207, FAX (310) 393-4818**

1. Technical Architecture Framework for Information Management (TAFIM): Ken Kaufman
2. 3COM AccessBuilder Remote Access Servers: Joan McCaffrey (Mc Info)
3. Simulation and Human Systems Technology Division: Kevin Boner
4. Universal Threat System for Simulators: Jim Santangelo
5. Requirements: Luci Haddad

**9.0 AUTHORITY DATA SOURCES SUBGROUP MEETING NOTES, FRIDAY,  
SEPTEMBER 9, 1994**

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# 9.1 ATTENDEE LIST

## THE AUTHORITATIVE DATA SOURCES SUBGROUP MEETING AT IDA FRIDAY, SEPTEMBER 9, 1994

<u>NAME</u>	<u>ORG</u>	<u>FAX #</u>	<u>PHONE #</u>	<u>E-MAIL ADDRESS</u>
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Bill Burch	ISA	(703) 578-2568	(703) 578-2587	burchb@isa.eastops.com
David Danko	HQ DMA	(703) 285-9397	(703) 285-9238	dankod@pentagon-emh5.army.mil
William Dunn	AMSMO	(703) 607-3381	(703) 607-3384	william.h.dunn@pentagon-dms18.army.mil
Dan Hogg	J-8/JCS		(703) 697-8899	dhogg@mh1.js.mil
Mike Hopkins	USCENTCOM/CA/CSC	(813) 828-4919	(813) 828-6430	mhopkins@ccca.centcom.mil
Chien Huo	JIEO/DMSO	(703) 988-0667	(703) 988-0660	huoc@msis.dmsi.mil
Mark Ralston	AMSAA	(410) 278-2788	(410) 278-6577 or 6597	ralston@arl.mil
Eleanor Schroeder	NA VOCEANO	(601) 688-4639	(601) 688-5502	eleanor@msis.dmsi.mil
Pat Simes	DMSO Support SRA	(703) 558-4723	(703) 558-4001	simes@sra.com
Omar Spaulding	NASA	(202) 358-3098	(202) 358-0777	ospaulding@mtpe.hq.nasa.gov
Walt Swindell	USA TRAC	(913) 684-3866	(913) 684-3030	swindelw@trac.army.mil
Rob Wright	RCI	(407) 658-9541	(407) 282-1451	wright@msis.dmsi.mil

## **9.2 MAIN OBJECTIVES OF MEETING**

As a result of the 15 July 1994 meeting, Mr. Hopkins requested subgroup members for points of contact for authorized data sources and centers. On 12 August, he followed up by creating and faxing a data sheet form for identified POCs to provide data description information on their sources/centers. An overwhelming positive response resulted in approximately 70 sources providing information. The purpose of the 9 September meeting was to assess the results of the information provided and determine the direction to proceed in developing the Data Sources Directory (DSD).



### 9.3 MEETING NOTES

- a. Dr. Chien Huo of DISA/DMSO began by pledging his support to the ADS Subgroup efforts. Working with Mike Frame of IDA, he plans to use DMSO support to place the DSD on the World Wide Web(WWW)/MOSAIC Internet. Mr. Spaulding raised the question of potential network overload in the twenty-first century. Dr. Huo wants to use WWW because of its wide spread availability and open systems environment capability.
- b. Mr. Hopkins reviewed the current results of his survey. Regarding the entry on the survey form "DBMS Modeled (Yes/No) (Planned/Not Planned)," discussion ensued on the DoD Enterprise Model and C2Core. Dr. Huo explained that the Enterprise gives the overall view whereas the C2Core Data Model gives specific applications. Integration efforts occurred last fall; C2Core extends, not replaces, Enterprise. The top level has been incorporated. A DDRS query shows which C2Core elements have been approved and incorporated into Enterprise. The intent of the question on the form was to determine if the DBMS had been modeled--not necessarily to what. Consensus of the group is that the intent of the question should be use of IDEF1X. If not IDEF1X, what modeling technique was used?
- c. The subject of M&S Data Categories was discussed. Mr. Dunn explained that due to the responses on his earlier Data Categories review, he had decided to leave the major categories as they are for the purposes of completing the source/center information survey. Respondents can utilize the sub-category to differentiate their respective functions. Dr. Huo wants to ensure everyone agrees with the categories architecture before putting the DSD in WWW/MOSAIC.
- d. The term "Authoritative" was debated for ADS purposes. As an example in the Army, which is authoritative--DMA or Topographic Engineering Center for terrain? Mr. Ralston, co-chair of the Data Guidelines subgroup, advised that implementation of the DSD will force policy decisions because of new or less well-defined customers who will be requesting data access.
- e. Dr. Huo revisited the subject of Responsibilities. Mr. Ralston said that this is being resolved in the Data Guidelines subgroup. As they develop the responsibilities, the ADS subgroup should coordinate with them.
- f. Dr. Huo stated that a Data Security Task Force was being formed and that we should coordinate with them. He also passed out a White Paper which covers Iris Kameny's goals. He challenged the group to consider establishment of Executive Data Agents (e.g. Environment, consisting of Ocean, Atmosphere, and Ground). He asked the group to review the paper and return comments ASAP.
- g. Group members were concerned about the fact that entries into the source/center survey have not been officially blessed by their commands or agencies. Dr. Huo will provide a DMSO survey memo requesting that the data source/center information base be reviewed and released.

After an IDA demonstration of WWW/MOSAIC, the meeting adjourned at 1445.

#### 9.4 ACTION ITEMS

- a. Dr. Huo requested the ADS group prepare a "Public Relations" advertisement for the Data Sources Directory similar to the Army MOSAIC model catalog tri-fold.
- b. Dr. Huo further requested that a charter including the mission and responsibilities of the ADS subgroup be developed.
- c. The following were tasked to follow up on data source/centers which had been identified but who had not yet responded.

#	Taskee	Data source/center
1.	Mr. Burch	ARMS
2.	Ms. Schroeder	Navocean
3.	LTCOL Hogg	Marine Corps
4.	Mr. Coale	DIA
5.	Mr. Spaulding	NASA
6.	Mr. Danko	DMA
7.	Mr. Hopkins	BMDO, Defense Mgt Data Center, SIMA, MLLB, AFMC
8.	Mr. Dunn	Various Army, MDDC, KDEC
9.	MAJ Barland	Various Air Force
10.	Dr. Huo	NEON and BFTT

Target for submissions is 3 October to Mr. Hopkins.

## **9.5 NEXT MEETINGS**

The next Data Guidelines meeting will be on 18-19 October at IDA. The next ADS meeting will be in Tampa in conjunction with the CENTCOM-hosted Fourth Annual Joint M&S Database Conference meeting the first week in November.

**10.0 REPOSITORY TASK FORCE MEETING NOTES, OCTOBER 17, 1994**

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## 10.1 AGENDA

MONDAY, OCTOBER 17, 1994

- 0830 - 0845 Review of objectives and issues of Repository Subgroup: Jim Augins
- 0845 - 0915 Overview of MSRR portions of Master Plan: Iris Kameny
- 0915 - 0945 Identification of MSRR prototype Object Set: Peter Valentine
- 0945 - 1100 Identification of existing developmental components that could be incorporated into the MSRR - ALL please provide inputs with budget estimates of effort required to Jim Augins prior to OCT 10
- 1100 - 1115 Break
- 1115 - 1145 Description of NWTDB SIDS Tool: SWL
- 1145 - 1215
- 1215 - 1300 Lunch
- 1245 - 1345 Identification of components of MSRR that need to be designed and built from the ground up: P. Valentine with inputs submitted from ALL send to Pete prior to OCT 10
- 1345 - 1430 Status presentation from the Complex Data Task Force: TBS.
- 1430 - 1700 Working session to: define tasks to be carried out, how these will coordinate with activities briefed earlier, and development of roadmap: led by Jim Augins and Peter Valentine, with active participation of Iris Kameny and Chien Huo

## 10.2 ATTENDEE LIST

### REPOSITORY SUBGROUP MEETING AT IDA MONDAY, OCTOBER 17, 1994

<u>NAME</u>	<u>ORG</u>	<u>FAX #</u>	<u>PHONE #</u>	<u>E-MAIL ADDRESS</u>
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Michael Davis	USAF/TACCSF	(505) 846-1486	(505) 846-2391	
Michael Frame	IDA	(703) 845-6788	(703) 845-6668	frame@ida.org
Peggy Gravitz	COLSA	(205) 971-0002	(205) 922-1512, X2170	gravitzp@msis.dmsd.mil
Allen Hess	PRA	(703) 243-6619	(703) 243-6613	mrdata01@tecnol.jctc.jcs.mil
Robert B. Hulsman	BDM/TACCSF	(505) 846-1872	(505) 846-4680	rhulsman@msis.dmsd.mil
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### **10.3 MAIN OBJECTIVES OF MEETING**

Main objectives of working meeting: (1) to review and refine MSRR planned tasks identified at August meeting; (2) to determine how they should be coordinated with other relevant activities and the tentative master plan; and (3) develop a roadmap for carrying them out.

## 10.4 MEETING NOTES

Note two changes in names and acronyms:

- Information/Database Technology Working Group (I/DBTWG) to Data and Repositories Technology Working Group (DRTWG)
- Information Resource Repository (IRR) to M&S Resource Repository (MSRR)

**Mr. Jim Augins:** Review of Repository Subgroup Objectives and Issues

The main objective of the Repository Subgroup is to provide M&S data and information resources to support the following M&S community groups (the counts are of those people at the meeting who consider themselves to be part of that respective group):

- Warfighter (1)
- Data Administration Community (6)
- Training and Exercise Community (7)
- Analysis (R&D, P&L) (3)
- Test and Evaluation (5)
- M&S System Developers (0)

The MSRR requirements can be categorized into three groups: Architecture, contents and tools.

Augins characterized the architecture as distributed, modular and heterogeneous environment vice TAFIM. This evoked some discussion as to why he didn't consider the TAFIM broad enough to support the entire M&S community where DISA considers it broad enough to support the DoD community. This issue will be visited again during the repository requirements analysis task.

The MSRR contents include: Instance databases, metadata, directories/catalogs, algorithms, and models and simulation. The tools must support directory access, browsing, linking, configuration management, and security.

Four DMSO Master Plan issues were identified:

- (1) Access and use of M&S resources across DoD
- (2) Identification of Authoritative Data Sources for M&S resources and establishment of common data standards
- (3) Configuration control of M&S reusable resources (data, algorithms, models, simulations),
- (4) Identification of data security requirements.

Augins identified 12 Repository Subgroup issues:

- (1) Defining an MSRR to cover all functional needs of managing metadata, data, and M&S
- (2) Addressing communications standards to support interoperation, information exchange and browsing
- (3) Identifying security concerns
- (4) Insufficiencies of DDRS repository and other standards such as FIPS 156
- (5) Addressing multi-valued instance data with respect to source and classification (given it comes from different sources and the instances may be at different classification levels.
- (6) Objects vice data
- (7) Repository update requirements for both metadata and instance data (currency and synchronization problems)
- (8) Real world vice M&S data
- (9) Archive and retrieval of M&S data sets, M&S results and conclusions, and mapping between inputs and results and conclusions
- (10) File interface standards



- (11) Lack of a common open interface between CASE tools
- (12) Metadata for tagging quality, security, and audit trail

### **Iris Kameny: Overview of MSRR Portions of the Draft Defense M&S Master Plan**

There are five main points about data and repositories:

- (1) DMSO is the FDAd for M&S
- (2) DRTWG has developed well defined set of needs and plans for the M&S community in the data area
- (3) TWISTIAC serves as a clearing house for knowledge and activities related to M&S
- (4) Next step is to develop policies and procedures in areas of complex data, data VV&C, authoritative data sources, and configuration management of information resources
- (5) Need to develop an internetted, distributed MSRR

There are three areas recognized in the Master Plan as needing authoritative representations that will require authoritative data sources, VV&C, resource repositories and configuration control. They are environment (terrain, atmosphere, ocean), systems (major platforms, weapons, units, life support, C4I, and logistics), and human behavior (human capabilities and limitations, individual and group performance, effects of organizational configuration on performance, C3 and doctrine and tactics).

The main issues with providing MSRR to meet developer and end user needs were described earlier as the 4 Master Plan issues. Actions that are to be taken are to develop: (1) an MSRR, (2) taxonomy and directory of authoritative data sources and common data standards, (3) MSRR configuration control procedures and tools, and (4) specific M&S data security requirements.

The road map to developing the MSRR calls for:

- Requirement definition by 1Q FY96
- Prototype (for FDAd MSRR) by 1Q FY97
- Limited testbed by 2Q FY98
- Initiate DoD-wide distribution FY99
- Complete distribution in FY00

### **Chien Huo: Draft Defense M&S Master Plan**

Chien Huo passed out copies of the new draft Defense M&S Master Plan and briefing charts on (1) Sub-Objective 5-2 key actions toward developing methodologies, standards, and procedures for the VV&A of M&S and the VV&C of data; (2) Sub-objective 5-3 key actions to provide a resource repository system to meet developer and user needs; (3) M&S Data Administration road map from 95-96 through 2001; and (4) a list of DMSO Sub-Working Groups, including Functional WGs, Technology WGs and Task Forces showing their organization prior to May 94, at present, and proposed.

### **Peter Valentine: Identification of MSRR Prototype Object Set**

- Peter discussed the M&S Information gopher at DTIC accessible through `gopher//dms0.dtic.dla.mil` which contains all the current information about the DRTWG, including notes from DRTWG meetings, Task Forces and subgroups, membership lists, etc.
- The World Wide Web (WWW) access to pages at JDBE, NRaD (repository) and DMSO can be accessed through `WWW HTTP//138.27.204.18/`. The WWW provides a hypermedia interface and is inherently distributed. There is user-friendly, free, MOSAIC client software available for all platforms using WWW
- It was suggested that we may want to support implementation of WWW home pages at various places, including: repository (NRaD), JDBE, Authoritative Data Sources (CENTCOM), VVC (RAND)
- JDBE data models are currently supported by the ERwin tools that can be printed via postscript files

- A Common Gateway Interface (CGI) standard: can provide a user interface to databases independent of DBMS products; it has just been made available in WWW form
- Access to database and M&S directories: suggested Oracle through MOSAIC browser, JDBC is experimenting with CGI part
  - Use Army Mosaic to populate the M&S directory
  - Battelle to populate the DB directory?
  - Use WWW to help capture data for directories
- Discussed new Army Information on Models, Simulations, and Studies System (AIMSSS) that consists of
  - Army Mosaic
  - VV&A Repository Online of Models and Simulations (VVAROOM)
  - Summary page for each Army study conducted over past five years
- Tagging: how do we deal with security and quality tags and audit trail tags?

**James Mathwick: Description of NWTDB System Information Directory (SID) Tool**

- SID purpose: to serve as a tool for managing the integration of Distributed Information Systems in support of the tactical commander
  - Design criteria: evaluate, migrate, manage integration of information from diverse sources and environments; integrate tools, services, and utilities from diverse sources
  - Tasks: (1) register and maintain current view of existing systems; (2) promote consensus view of information requirements; (3) migrate to DoD standards
  - SID requirements are a wish list
  - There is an IDEF0 model for "conducting Navy Information Management"
  - SID federation of automated tools include: CASE tools such as IE Expert, IE Advantage; ERwin/ERx (IDEF1X); BPwin (IDEF0); and ObjectView and PowerView

**Discussion: In Reference to FY-95 MSRR Planning Budget**

Task A: Need to redo Subtask A, MSRR Requirements Analysis and Identification, and expand its scope

- Subtask 1: will be the requirements subtask to include:
  - Development of IDEF0 models (for M&S FDAd, M&S DA, and M&S organizations submitting standards)
  - Coordinate IDEF0 models for M&S organization submitting standards with Services and within each Service across functional communities
  - Extend IDEF0 models to data centers, reuse repositories, DIS exercises and post processing
  - Develop metamodel for repository objects: data standards; data administration models; directories; instance data/exchange between centers, security, common domains, etc.; M&S reuse repository; DIS exercise stuff
  - JDBC could support IDEF0 and IDEF1X modeling efforts
- Subtask 2: change old 3 to Subtask 2: define and Document choice of Platform and Development Environment, etc.: address Sun and PC environment
- Subtask 3: change old 2 to Subtask 3: develop Alternatives: include white paper on lack of compliance with TAFIM if that is an alternative
- Products: add IDEF0 models, IDEF1X metamodel, Alternatives Analysis Document to Draft Systems Requirements Document and System Development Plan

**Task B: Change name to Prototype MSRR Data Resource Exchange Architecture**

- Subtask 1: change old 2 to Subtask 1, "Implement Prototype Architecture Design"
- Subtask 2: change old 1 to Subtask 2: support M&S community in Creation/Maintenance of WWW servers: include support for SMEs
- Subtask 3: change name to refer to prototype: build WWW Interface for the Prototype M&S and Database Directories

- Reconsider/remove Subtask 4: modify existing unclassified versions of high interest systems (TBS , e.g., ARMS, SID) to incorporate a WWW interface for interfacing with MSRR
  - Issue: could be done as part of some M&S data project;
  - Separate security issue and address in Security Task Force

Task C: Provide First Increment of Tools to Support M&S FDAd Prototype Repository. Consists of two options: suggestion is to look across Options I and II and further. The intent is to meet immediate requirements.

- Tools should support prototype MSRR for FDAd
- Option I.1, Integrate ADEF tools with WWW: need better definition of this subtask and a better evaluation of ADEF from the DAPMO
- Option I.2, Create consolidated metamodel for M&S community: this should be coordinated with Task A.1; metamodel developed in Task A.1 and Task C could look at interchange format for metamodel
- Option I.3, Create a Data/Proposal package tracking database: this should be included and online
- Option II: install an enhanced version of the NWTDB SID system and process to support the M&S FDAd. Discussion of SID for MSRR: seems to be going on independently of DDR, and it is hard to know how much of it is real. If we are going to evaluate SID as part of the MSRR effort, we need to discuss with Carla Von Bernewitz who received a briefing on it and we need an annotated briefing or white paper, something more definitive than the briefing we were given

Task D: Develop capability to support distributed heterogeneous database query generation and data access over WWW

- Have to show need for this and statement about data components to make this widely releasable
- Look at commercial products

Task E: Provide a First Increment Software Reuse Repository and define unmet requirements: this should be part of Task A requirements Subtask 1 and should be coordinated with the Army

Task F: Repository Working Group Support: make this part of the other tasks

Task G: Program Management: leave in as a task

Summary: The Repository Subgroup needs to clean up the task list.

## 10.5 ACTION ITEMS

### For Jim Augins and Pete Valentine

1. The DRTWG needs a written understanding of what the M&S Repository is, what will be implemented, and assurance that it is consistent with DoD data administration
2. The Repository subgroup needs to clean up the Repository task list.
3. The Repository Subgroup needs to identify representatives from the Components to participate in the Subgroup and Tasks
4. The Repository Subgroup needs to organize a steering group to lead the five tasks

### Chien Huo and Iris Kameny

5. Call the Army (Lana McGlynn) to ask who Army assignees are to different DRTWGs (and also other services)
6. Go back to services for MSRR requirements and invite them to a requirements meeting

### Issues Identified:

1. Is TAFIM broad enough architectural standard to serve the M&S community? Need white paper to discuss TAFIM compliance/non-compliance
2. Present issue to DDRS Steering community: need common architecture for data standards repository, software reuse repository, database repositories. The MSRR concept and implementations need to be coordinated across DoD.
3. Chien Huo needs to publish procedures for use of data standards (e.g., DDRS access, etc.). The DRTWG community need to let him know if they have DDRS access, etc. There is also a need for establishing policy and procedures for accomplishing data standards within the M&S community.
4. Need to develop policy/procedures to make Services responsible for implementing, populating, and maintaining their own database and M&S directories, and being able to do distributed access to all directories built on common data model.
5. DoD needs to produce:
  - IDEF0 model of how the DoD does information management
  - The DoD data standards (DDRS) requires a metadata model of the data elements that describe DoD standard data elements
6. Shareability and releasability of data needs to be addressed

**11.0 DATA VV&C TASK FORCE MEETING NOTES, OCTOBER 18-19, 1994**

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## 11.1 AGENDA

TUESDAY - WEDNESDAY, OCTOBER 18-19, 1994

Main objectives of working meeting:

- (1) To review and refine Data VV&C Guidelines Subgroup tasks identified at July meeting;
- (2) To determine how they should be coordinated with other relevant activities and the master plan; and
- (3) Develop a roadmap for carrying them out.

TUESDAY OCTOBER 18, 1994

- 0815 - 0845 Review of objectives and issues of VV&C Task Force: Iris Kameny
- (Added) DMSO Activities: Dr. Chien Huo
- 0845 - 0915 Overview of VV&A of Distributed Simulations Project and results of September 21 IPR: Pam Blechinger
- (Added) IDEF0 Modeling of the DIS VV&A Process: Peggy Gravitz
- 0915 - 0945 Report on VV&A of Distributed Simulations, Data Consistency Task (IPR September 21): Susan Solick
- 0945 - 1030 Report on DIS VV&A WG held in Orlando Sept 26-30: Simone Youngblood
- 1030 - 1100 Break
- 1100 - 1145 Report on MORS SIMVAL Workshop held in Albuquerque September 29-30: Bob Hartling
- 1145 - 1215 Update on Navy VV&A: Bob Hartling
- 1215 - 1315 Lunch
- 1315 - 1345 Report on RAND VV&A Primer Progress: Bruce Bennett
- 1345 - 1445 Discussion of morning topics: led by Bob Hartling and Mark Ralston
- 1445 - 1700 Working session to: define tasks to be carried out, how these will coordinate with activities briefed earlier, and development of roadmap: led by Bob Hartling and Mark Ralston, with active participation of Iris Kameny and Chien Huo

WEDNESDAY, OCTOBER 19, 1994

- 0830 - 1200 Working session on Database Quality Profile: Jeff Rothenberg (need participation from data centers)
- 1200 - 1300 Lunch
- 1300 - 1400 Report on Authoritative Data Sources status and plans: Bill Dunn and Mike Hopkins

1400 - 1700 Discussions TBD during meeting: Led by Iris Kameny

# 11.2 ATTENDEE LIST

DATA VV&C TASK FORCE MEETING  
TUESDAY - WEDNESDAY, OCTOBER 18-19, 1994

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### 11.3 ACTION ITEMS

- (1) Peggy Gravitz to distribute copies of the IDEF0 process model for DIS VV&A.
- (2) Group to provide changes and additional input to the list of authoritative data sources and data centers.
- (3) JDBE to convert Authoritative Data Sources directory to a PC database file.
- (4) Upcoming Meetings: (a) DIS VV&A process modeling group will meet in Huntsville 15-16 November. (b) Authoritative data sources subgroup will meet during the CENTCOM M&S Database Conference, 3 November.
- (5) Summary of actions with respect to Data VV&C tasks 1-3
  - (1) Initial definitions are OK
  - (2) Chien Huo will get back to the co-chairs with dollars and timing information as to when funds will be available
  - (3) Task 1 people will produce at least 5 IDEF0 models (Army, Air Force, Navy, OSD, and either Marines or JCS)
  - (4) Mark Ralston would like to get more detailed task descriptions and decide on the leaders of Tasks and Subtasks
  - (5) Will require DMSO funding support for Task leaders
  - (6) SAG oversight will be Hartley and Ralston: Task leaders will create their plans and their organization will be responsible for carrying them out

#### Financial Management:

- (1) Will use FY95 DMSO dollars
- (2) Contracting vehicle choices
  - a. IDEF0 contractor support from DMSO (e.g., JDBE, COLSA)
  - b. Government organizations need to share their contract vehicle possibilities with DMSO

#### Task Management:

- (1) Task 1: will run March to Sept and produce draft guideline and be led by Lt Col Denny Lester
- (2) Task 3: has no assigned leader, can start when: a leader is identified, participants are identified and willing (e.g., DMA, DIA, Oceanographic, JTAMS), funding is available
- (3) The co-chairs need to identify a leader for Task 3
- (4) Chien Huo will give the co-chairs a statement-of-work (SOW) example they can use for format and content
- (5) Chien Huo and Dave Danko will talk with Bob Jacober (DMA) about doing an IDEF0 model

Denny Lester observed that problems with diving into this are that there is too much to do; asks are overlapping; and those working on the tasks take risk of being spread too thin.

## 11.4 PRESENTATIONS AND GROUP DISCUSSION

- (1) Review of objectives and issues of VV&C Task Force: Iris Kameny, RAND  
Ms. Kameny identified the objectives of the Data VV&C Task Force as: (a) Develop guidelines for performing data VV&C to include definition of the process, development of cost models and databases, and development of a quality profile for databases. (b) Identify authoritative data sources and data centers and define their responsibilities. There were no suggested changes to the objectives.
- (2) DMSO Activities: Dr. Chien Huo, DMSO  
Dr. Huo discussed the new DMSO organization:  
Director DMSO: CAPT Jim Hollenbach, USN  
Deputy Director DMSO: COL Jerry Wiedewitsch, USA  
Chief of Staff: Mr. Gary Yerace  
Science and Technology Division: Chief Scientist (TBD)  
Technology Application Division: CDR Gary Misch, USN  
Operations Division: Lt Col Dave Bartlett, USMC  
Business/Financial Management Division: Mr. Waverly Debraux

Dr. Huo distributed copies of the 30 September 94 draft Modeling and Simulation Master Plan. He indicated that the first priority identified in the Master Plan is M&S architecture followed by data standardization. Dr. Huo reviewed recent changes in the DMSO organization. Functional data administration will be performed in the Science and Technology Division.

The Information/Database Working Group will be renamed the Data and Repositories Technology Working Group (DRTWG). Dr. Huo and Ms. Kameny have been appointed as chairs of the Data and Repositories Working Group. A final decision was scheduled for 21 October. VV&C is addressed under VV&A objectives in the Master Plan, but will continue to be addressed in the Data and Repositories Working Group by the Data VV&C Task Force.

- (3) Overview of VV&A of Distributed Simulations Project and results of September 21 IPR: Pam Blechinger, TRAC

The main goal of this DMSO-sponsored task is to define and document the distributed simulation VV&A process. It is currently working with the DIS VV&A Working Group toward reviewing, refining and expanding the DIS VV&A process. Current participants in the task are TRAC, SSDC, AMSAA, NAWC TSD, SPACECOM, and Wright Labs. Current funding for this task is \$700K of DMSO funding with \$1M of matching funds from the project participants. The first phase of the project is scheduled for 31 March 1995 completion. The first year effort concentrates on verification tools, techniques, and procedures for DIS applications. The second year effort will address validation. Specific technical tasks include:

- (a) Develop procedures to determine algorithm consistency.
- (b) Develop procedures and tools to measure network overload.
- (c) Evaluate DIS compliance testing.
- (d) Develop procedures to determine database consistency.
- (e) Test verification techniques.
- (f) Validate and accredit the North American and US Space Command Integrated C2 Analyst Test Environment (NATE) composite model. NATE is not DIS compliant.
- (g) Collect tools useful for VV&A.

- (h) Produce a VV&A implementation guide.

The current model for DIS VV&A was reviewed. The question was raised as to what the "DIS Repository" contains. Ms. Kameny suggested that this should include data standards, models and simulations, instance data, complete DIS exercises, and the tools to manipulate these objects.

To date, an IDEF0 process model of the DIS VV&A process has been developed. This model goes 3 to 4 levels deep in its description of the process. Ms. Blechinger asked for help from the M&S community in refining the process model in the areas addressing VV&C of data.

There is a need to define the terms: compliance, compatibility, and interoperability. Both this project and STRICOM are trying to define these terms. A white paper discussing compliance is available.

A draft of the Methodology Handbook is available. Future activities include:

- (a) Refinement of the process model,
  - (b) Reconciliation of the Compliance Testing Specification with the IST compliance test suite,
  - (c) Testing the process defined in the IDEF0 model,
  - (d) Completing the Methodology Handbook ( planned completion March 1995) and beginning the implementation guide
  - (e) Establishing second year funding to address validation and accreditation.
- (4) IDEF0 Modeling of the DIS VV&A Process: Peggy Gravitz, COLSA Corp.

The initial development of the IDEF0 process model for DIS VV&A was developed using groupware at MICOM's Electronic Meeting Systems facility at Redstone Arsenal. This allowed collaborative development of the model. The development of the model took 5 days. The model has since been transferred and is being further developed using the BPWin software. Ms. Gravitz circulated a sign-up list to receive copies of the IDEF0 model. Ms. Gravitz also provided copies of a paper she and William Jordan, SSDC, developed entitled "Utilizing IDEF0 for Examination of the Individual Activities of the DIS VV&A Process Model." This paper gives further insight into the process of developing the IDEF0 model.

- (5) Report on VV&A of Distributed Simulations, Data Consistency Task: Susan Solick, TRAC

DIS data VV&C model assumptions: (1) data, for the most part, have previously undergone VV&C at the component level (V&V agents review records before data and components are accepted for DIS exercise, and deficiencies are identified and corrected by component and data sponsor); and (2) data V&V must occur before the DIS exercise can be validated.

Ms. Solick identified those portions of the IDEF0 model that address data constancy in the VV&A of DIS:

- (a) Activity A.2.2.4 - Evaluate data and database requirements includes:
  - [1] Review documents
  - [2] Examine databases and sources for data availability and credibility
  - [3] Evaluate data congruity
- (b) Activity A.2.3.4 - Evaluate data and database designs includes:
  - [1] Verify data implementation
  - [2] Evaluate data consistency

[3] Assess data collection

Ms. Solick indicated that the "key elements" addressed in the process model are those involved in the interfaces. Ms. Kameny observed that the interface data requirements could be derived from the requirements for data local to the components in the simulation.

Jeff Rothenberg raised the concern that the process model may artificially separate model VV&A from data VV&C where two processes are tightly coupled.

- (6) Report on DIS VV&A WG held in Orlando Sept 26-30: Simone Youngblood, Johns Hopkins APL

The goals of the DIS VV&A for the 11th workshop were:

- (a) Develop a DIS VV&A "Recommended Practices" document
- (b) Refine and expand the DIS VV&A process
- (c) Define and integrate DIS VV&C requirements into the VV&A process
- (d) Identify and develop methods, techniques, and tools for performing DIS VV&A and VV&C process
- (e) Define DIS VV&A and exercise repository requirements.

The DIS VV&A process is being proposed as an IEEE standard - Fidelity Management and usability Guidelines.

A paper on the DIS need for DoD data standards was presented at the workshop and a petition was circulated to set up DIS special interest group on data standards and repositories. The petition was circulated at the VV&C meeting.

The DIS VV&A subgroup addressed the role of the accreditor in the VV&A process. They noted that the accreditor must be a participant in the requirements definition and requirements prioritization for a DIS exercise. The subgroup also discussed how to V&V human behavior models with the Computer Generated Forces working group.

Ms. Youngblood noted that the data validation addressed in the DIS "Develop VV&A Plans" process is from the data producer perspective. She also indicated that the compliance testing of DIS components is done "a priori," not as a DIS exercise is created.

- (7) Report on MORS SIMVAL Workshop held in Albuquerque September 29-30: Bob Hartling, OPNAV

A major topic of this conference, attended by 125 participants, was "How much V&V is enough?" The major topics addressed were:

- (a) Developing an accreditation template
- (b) Representation of V&V status
- (c) Accreditation factors - criteria for acceptance
- (d) Differences in V&V of legacy simulations

The conclusion at the conference was that a "super template" can be produced to support accreditation which would provide a menu of procedures and techniques. This template can then be tailored for a specific application. A strawman template was developed and it will be posted on the MORS bulletin board. Jeff Rothenberg suggested that this should be considered a V&V template, not an accreditation template.

The conference attendees decided that it is possible to represent a status of the verification process, but not necessarily the validation process. The attendees agreed that there are no "units of V&V" (the levels of V&V > issue). They also decided that the distinction of "legacy" models was not a useful one. The same VV&A processes apply equally to all models. The only distinction is the reverse engineering that is often needed for "legacy" models.

(8) Update on Navy VV&A: Bob Hartling, OPNAV

Mr. Hartling addressed the VV&A policy, procedure, and guidelines initially developed by Johns Hopkins/APL in 1993. These were later distributed by the SPAWAR program. These policy, procedure, and guidelines call for 4 levels of accreditation:

- (a) Inspection - face value
- (b) General - mainly verification
- (c) Robust
- (d) Endorsed

Furthermore, they address two types of accreditation--domain and application specific. Current plans are to drop domain VV&A. The Navy, currently, doesn't have an agreed upon VV&A process but 23 Navy systems including ITEMS IAS have been V&Ved.

Mr. Hartling indicated that the Navy's M&S Master Plan sets up a "virtual" organization to address M&S at the Department of the Navy. The activities of the DoN M&S Management Office will be carried out by the Navy M&S Policy and Coordination Group and the Marine Corps M&S Policy Coordination Group. Mr. Hartling verified that the current Marine Corps accreditation is not tied to V&V.

The Navy M&S library currently contains 600 entries. This library contains no VV&A or CM information. It also contains many models and simulations which are out of data and no longer used. Mr. Hartling indicated that conceptual models of existing models will be built. These will include descriptors to record user's experience of use with these models. The Navy will perform centralized control by accepting V&V documentation of M&S into the library but the V&V will be executed in a decentralized manner.

(9) Report on RAND VV&A Primer Progress: Bruce Bennett, RAND

Mr. Bennett observed that M&S conceptualization and validation are unique challenges in the military operations arena. In military operations M&S we simulate qualitative factors such as human behavior. These qualitative factors are difficult to validate and as a result, validation is often incomplete. The burden of validation shifts from the developer to the application user. To do proper validation, we must concentrate on the processes in the M&S and not just look at results. We typically resort to doing "invalidation" of M&Ss by just examining results.

Mr. Bennett indicated there were two distinct stages to VV&A--preliminary accreditation (planning) and final accreditation. Mr. Hartling noted that this was especially applicable to DIS exercises where it is impossible to accredit the components up front.

Howard Haecker observed that historically, the user of a model will change the data until the model result comes out right. Mr. Bennett stated that he has seen changes to the model just as often.

Another key point of Mr. Bennett's presentation was that historical cases have limited value in the VV&A of military operations M&S. This is the result of constant changes in both doctrine and technical data.

The question was raised as to how all of the guidelines, policies, and procedures mentioned to that point related. The following breakdown was suggested:

<b>Document/Models, etc.</b>	<b>Intended Use</b>
DMSO VV&A TWG M&S VV&A Primer (RAND)	Reference for novice application sponsor, ~ 40 pages, pictures and graphics
IPL 94-2 VV&A of Distributed Simulations DS VV&A Implementation Guideline	Guidance for VV&A doers and M&S developers
DS VV&A Methodology Handbook Appendix I: Data Consistency Appendix II: Algorithm Consistency Appendix III: Tools	For technical managers of M&S development
DIS VV&A WG DIS Recommended Practices	Guidance for VV&A practitioners, contains lessons learned
IDEF0 Model Specification for DIS VV&A	Reference materials for VV&A agent Terminology and process definition
DRTWG Data VV&C Task Force Data VV&C Quality Profile	Reference for data user and producer
Guidelines for VV&C for data producers	e.g., AMSSA, DIA, DMA
Guidelines for VV&C for data users	Users: e.g., data centers such as TRAC, ARMS, CENTCOM's CFDB, J 8's OASIS
Authorized data sources	Reference for M&S application developer
IDEF0 models for data VV&C (producers and users)	data producers and users
DRTWG Directories for databases, M&S, and authoritative data sources, and DIS exercises	For use throughout M&S community
Taxonomies for the directories	Users of directories

Note: The DS VV&A Implementation Guide and DIS Recommended Practices documents may be combined.

(10) Discussion of morning topics: Mark Ralston, AMSAA

The goals of the VV&C Subgroup as defined in prior meetings are broken into three tasks:

- Task 1: Develop guidelines for non-DIS user VV&C
- Task 2: Develop guidelines for DIS user VV&C
- Task 3: Develop guidelines for producer VV&C

The consensus in the group was that Task 2 should use the results of the DMSO-sponsored effort, VV&A for DS, which is working with the DIS VV&A WG on an IDEF0 model for DIS VV&A/C. The group also agreed that Task 1 should look at the applicability of guidelines developed under these efforts and should begin in March 1995, complete in FY 95 and be funded by DMSO. The group agreed that Task 3 should begin as soon as possible with DMSO funding.

Task 1 was broken down into the following subtasks with suggested funding levels and durations:

- Subtask 1: Decide on scope
- Subtask 2: Develop IDEF0 models of the current practices used in DoD components, DMSO funding = \$350K, duration = 2 months /component.
- Subtask 3: Develop an integrated IDEF0 model, DMSO funding = \$50K, duration = 6 months
- Subtask 4: Pilot studies, deferred until FY 96.

The following personnel were identified as component points of contact for the Subtask 1 development of current practices models:

- Army — Mark Ralston
- Navy — Bob Hartling
- Marine Corps — vacant
- Air Force — vacant
- OSD — vacant
- JCS — vacant (Mike Hopkins recommended GCCS with Cozy Bailly as a point of contact)

If JCS and Marine Corps are both used, then this will require an additional \$50K. Lt Col Denny Lester agreed to lead Task 1.

Task 3: a DMSO funding level of \$400 was suggested for Task 3 and there is no leader for this task (Lt Col Barker tentatively volunteered and then withdrew). Suggested producers to participate include DMA (POC: David Danko (they have IDEF0 as-be model); DIA: POC Dr. Guenther; NAVOCEANO: POC Eleanor Schroeder. Howard Haecker suggested that the Battlefield Environmental Directorate at WSMR be included.

Lt Col Barker questioned the value of modeling current practices for VV&C since they are not formally documented. Iris Kameny responded that this would provide the advantage of having current best practices to work from when developing proposed guidelines.

(11) Working session on Database Quality Profile: Jeff Rothenberg, RAND

Jeff Rothenberg distributed his 12 October draft of "A Data Quality Profile for VV&C of data to be Used in Modeling" and provided an overview of the paper. Data quality, as defined by Mr. Rothenberg, is the suitability of data for a consumer's purpose. He does not limit the definition to the factors described in DoD 8320.1-M-2 or DIGEST (DMA), such as timeliness, accuracy, relevancy, etc.. The data quality profile suggested by Mr.

Rothenberg encompasses three levels--database, data element, and instance data. The data quality profile contains meta-data needed both to allow verification and to record the results of verification. Mr. Rothenberg suggested that a data model be developed to understand the meta-data involved in a data quality profile. The group had the following observations and comments about the data quality profile.

Iris Kameny suggested that Mr. Rothenberg assist Ms. Solick to include the quality profile in the data consistency portion of the DIS VV&A/VV&C model.

Miranda Stern indicated that the DoD 8320 series of documents (which address data quality) are being updated and she will send Chien Huo a list of the 8320 documents and who is doing what.

Allen Hess stated that we can not anticipate all of the quality meta-data that could be needed, but suggested that we strive to set a minimal list.

Lt Col Barker stated that he does not see the need to separate producer's and consumer's views when characterizing the data VV&C process. He said they are spending three years and \$25 million to change the behavior of the collection community. They are looking for an 80/20 solution but hands on people have a problem with metadata. There is measured data and calculated data, and a need to be practical about the amount of metadata. However, capturing the data generation process is very important and includes the modification and propagation of data.

Jim Augins raised the concern about metadata about metadata and how many levels of recursion were needed? (Jeff Rothenberg thought just one, to include metadata about the metadata).

Howard Haecker raised concerns about the quantity of meta-data that will be required. He stated that it is nearly impossible to capture all of the knowledge about a data element. He suggested that we need information about the quality of user's decisions with regards to filling data voids or making modifications to data. Mr. Haecker sees "void management" as one of the areas of biggest payback for quality improvement. Lt Col Barker stated that those who fill voids in data bear the responsibility for providing feedback to the data producers. Bob Hartling suggested that this VV&C information be integrated into VV&C repositories.

Mr. Haecker is also concerned that we quantify the cost of data quality. Mr. Rothenberg indicated that we also need to capture the cost of not performing data quality checks, but that is difficult to quantify. Bob Hartling stated that one cost is the overbuilding of systems to compensate for lack of confidence in data. Another cost is the duplication of VV&C by users when it is not done by producers.

Linda Calvert recommended that we draw from current best practices to document the current baseline for VV&C. Mr. Rothenberg recommended that a pilot be done in concert with the producer VV&C guideline development. Mike Hopkins offered that CENTCOM's Data Quality Engineering program is a good candidate for documenting current data quality practices. He also added that current VV&C practices are being documented as part of the Authoritative Data Sources task.

Someone said that with respect to data generation, management and use: each and every community needs to accept equal responsibility for data quality and if data analysis/VV&C are paid for by the government, then the results need to be fed back for reuse.



The group consensus was on the following approach:

- (a) Identify current VV&C practices as part of the Authoritative Data Sources task
- (b) Pick some of the current processes for IDEF0 modeling of VV&C practices
- (c) Use one or more of these as data quality pilot studies.

Lt Col Danny Lester recommended that we plan for more long-term projects such as the Joint Advanced Distributed Simulation (JADS) project. Mike Hopkins suggested GCCS also be included.

**Suggested Actions:**

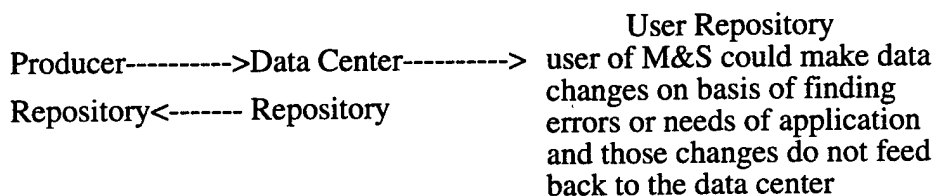
- (1) Communicate with component M&S organizations on supporting tasks 1 and 2
- (2) Investigate possibility of DISA support for component surveys and pilot studies
- (3) Investigate DISA efforts in V&V tools, and in distributed access and use
- (4) Need to better define categories of data quality and make the metadata machine readable
- (5) Suggestion that terms such as clarity, flexibility etc. that are qualitative be re-examined and that we stick to quantitative terms

**Steps Toward Data Quality:**

- (1) Find out what DISA/JIEO is doing about data quality with respect to Automated Resource Management Systems
- (2) Work with Authoritative Data Sources survey to follow up on what people are doing, e.g., Air Force Log Command uploads data from the bases, verifies and highlights errors and waits for the base to fix the data
- (3) Get support by asking study directors how much it costs to VV&C data and ask the decisionmakers how much overkill is there to compensate for bad or low quality data

**Summary of Data Quality Profile Issues:**

- (1) Metadata about metadata with respect to quality: one level of recursion
- (2) Concern with volume of metadata
- (3) Data modification or algorithm modification by M&S users: needs to be captured (base on case and sensitivity analysis)
- (4) Next version of data quality profile paper baseline: include current data centers and recognized needs as far as lessons learned about data quality (requirements, tools, etc.)
- (5) Difficulty and need to address data voids (missing data) in data collection
- (6) Need to add at database level, information on data source(s)
- (7) Usage V&V needs to be integrated into overall V&V; not enough to find data errors, their existence needs to be maintained in the repository. Question about how to handle VV&C errors, should the process require feedback to the



producer for change? if so, potential data errors need to be marked in interim so user is aware of them (CENTCOM CFDB is not doing this now).

12. Report on Authoritative Data Sources status and plans: Bill Dunn, AMSMO and Mike Hopkins, CSC (CENTCOM)

Mr. Dunn identified the following subtasks for the Authoritative Data Sources (ADS) subgroup and reported on their status:

Subtask 1: Finalize the taxonomy of M&S data. Currently the taxonomy proposed by Haecker/Swindell is being used. Dave Danko has some concerns in the areas of "environment" and "geopolitical" and will work with the members of the subgroup.

Subtask 2: Develop a data model for the ADS directory. A proposal has been submitted to DMSO which Dr. Huo has forwarded for funding. This data will be integrated with the existing M&S Database Directory data model.

Subtask 3: Populate the ADS directory. This is currently underway and is available on the Internet World Wide Web (at <http://trp.ida.org/msdb.html>). Currently there are 70 ADSs and data centers identified in the directory. Mike Hopkins asked that DMSO take over maintenance of the directory. Jeff Rothenberg suggested that the responsibility for maintaining the information be distributed so that individual sites can link their data element dictionaries to the directory through the World Wide Web. An area of concern here is the links between unclassified and classified networks. Roy Scrudder suggested that JDBE could translate the current directory from its current storage as a WordPerfect file to a xBase database. Then user's could use whatever tools they prefer to access and search the database. The group agreed to this approach.

Subtask 4: Identify responsibilities of ADSs, data centers, and users. This will hopefully come from the VV&C pilot studies. Iris Kameny stated that this be a "should-be" set of recommended responsibilities, not just "as-is." The responsibilities should be expanded to include release authority. Ms. Kameny feels we should identify the current shortfalls and needs to the OSD level through DMSO.

Subtask 5: Determine classified data exchange procedures and release authority. This will be moved to a new Data Security Requirements Task Force. Mike Hopkins identified the need to address the electronic interchange of data between data centers and ADSs. He feels the "need to know" restrictions are workable.

**12.0 AUTHORITY DATA SOURCES SUBGROUP MEETING NOTES,  
NOVEMBER 3, 1994**

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## **12.1 AGENDA**

**THURSDAY, NOVEMBER 3, 1994**

- 0800 - 0815**    **Introductions and Administrative Remarks - Bill Dunn and Mike Hopkins**
- 0815 - 1000**    **Finalization of Taxonomy for Data Sources Directory - Bill Dunn**
- 1000 - 1015**    **Break**
- 1015 - 1100**    **Update on Data Sources Directory Survey - Mike Hopkins**
- 1100 - 1145**    **Demonstration of Data Sources Directory with World Wide Web - Mike Hopkins**  
                  **(Note: this was cancelled due to being demonstrated the day before)**
- 1145 - 1230**    **Discuss subgroup taskings - Iris**
- 1230 - 1330**    **Lunch**
- 1330 - 1600**    **Follow-up discussion on M&S Taxonomy**
- 1600 -**           **Wrap-up & Adjourned**

## 12.2 ATTENDEE LIST

### AUTHORITATIVE DATA SOURCES SUBGROUP MEETING AT USCENCOM THURSDAY, NOVEMBER 3, 1994

<u>NAME</u>	<u>ORG</u>	<u>FAX #</u>	<u>PHONE #</u>	<u>E-MAIL ADDRESS</u>
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Mike Hopkins	USCENTCOM/CCCCA	(813) 828-4919 DSN 968-4919	(813) 828-6430 DSN 968-6430	huoc@msis.dmsomil
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Lana McGlynn	AMSMO	(703) 607-3381 DSN 327-3381	(703) 607-3384 DSN 327-3384	eleanor@msis.dmsomil
Eleanor Schroeder	NAVOCEANO	(601) 688-4639 DSN 485-4639	(601) 688-5502 DSN 485-5502	

### **12.3 MAIN OBJECTIVES OF MEETING**

Most of the meeting was devoted to further development of the Taxonomy for the Data Sources Directory. The Draft M&S Data Categories (initially distributed to members in June) was reviewed and suggestions for changes were made. Another objective of the meeting was to address the taskings of this subgroup as determined by I/DB Task Force and Subgroup chairs and co-chairs. A third objective was to provide a status report on the Data Sources Directory Survey. All three objectives were well met.

## 12.4 MEETING NOTES

### A. Taxonomy for Data Sources Directory

Discussion on this issue took up most of the meeting. Some of the discussion occurred in the morning session but had to be temporarily tabled so that the other issues could be addressed before people had to catch flights out. An afternoon session was held to continue the discussion.

It should be noted the meeting tended to jump around the top level categories. In the interest of efficiency, the notes will not reflect the discontinuities in the thought processes. The appendix to this lists what the suggested categories (and in some cases, subcategories) are.

The purpose of this issue is to construct a taxonomy of data that would break the authoritative data sources into more manageable pieces. The Army's data model was used as a basis with input from RAND.

It was agreed that the top level of the taxonomy should consist of generic categories. Based on that premise, discussion ensued as to why EQUIPMENT CHARACTERISTICS and EQUIPMENT PERFORMANCE show up at the top level instead of a category called EQUIPMENT. One of the AMSMO representatives explained that the army selected separate categories since the characteristic portion was to include data on the equipment that would be considered static (e.g., shipping information) while the performance portion was to include data that would be considered dynamic (e.g. speed of vehicle when in combat). Different subject matter experts (SMEs) are needed for these two categories. A suggestion was offered that would list EQUIPMENT as the main category with LOGISTICS, ENGINEERING SPECIFICATIONS, and PERFORMANCE AND FUNCTIONAL DESCRIPTIONS as the second level. This did not satisfy the Army representatives at the meeting. It was finally decided to list EQUIPMENT as the main category. EQUIPMENT CHARACTERISTICS and EQUIPMENT PERFORMANCE would be listed as level 2 categories.

This led into a suggestion that whatever was accomplished at this meeting would be released to the community as either a Beta test version or as a Version 1.0. The users of this taxonomy could then provide their input on how well it really works and modifications could be made on the taxonomy based on that input. It was agreed that this was a good idea.

COMBAT SUPPORT SERVICES was addressed next. It was noted that oftentimes the joint arena will adopt service's "label" and apply that label across the board. Combat Support Services is a term used predominantly by the Army. It was agreed to rename the category SUPPORT SERVICES. Level 2 categories were renamed to LOGISTICS, MEDICAL, and PERSONNEL. It was also at this point that FINANCE was determined to be a more generic term than COST, and thus was elected to be the top level category.

ENVIRONMENT and GEO-POLITICAL were the next areas of discussion. The DMA representative desired that the GEO portion of GEO-POLITICAL be removed. The BORDERS and CITIES/TOWNS subcategory listings belonged under the TERRAIN level 2 category of the ENVIRONMENT ("borders" fall under "boundaries" and "cities/towns" under "population"). Since DMA is the recognized authority on this, this modification was included. The DMA representative offered two level 3 breakdowns for the TERRAIN. One was obtained when DMA approached military map producers in

NATO; the other was obtained when DMA worked with users. It was opted to go with the user alternative. A question was raised on whether this is in line with what Jack Teller's (DMA) group was doing. It was stated that the Teller group was using the military map producer alternative as its starting point. A concern was raised on whether use of the Digital Topographic Data categories in DMA's "Digitizing The Future" book were being addressed by any of the groups. The DMA representative plans to coordinate with the Teller group before finalizing the TERRAIN subcategory listing.

An issue arose early in the discussion on electronic counter-measure effects. It was decided that a level 2 category under ENVIRONMENT would be created called EM and that this category would contain information such as that.

The Navy had previously submitted its suggested changes to the OCEANOGRAPHIC and NAVIGATION categories. These are incorporated in the Appendix listing. The SPACE/UPPER ATMOSPHERE category still needs to be subcategorized. This will be worked on before the next meeting.

TTP COGNITIVE was elected to remain as is.

The SCENARIO category caused some discussion. A clearer definition of scenario was desired by some of the members before subcategories could be discussed. Bob Hartling and Cathy Corland will attempt to tighten the definition.

Chien Huo then asked if the categories that are listed in the DoD Modeling and Simulation Master Plan should be used for the development of the Data Sources Directory Taxonomy. Iris Kameny said that her interpretation of the contents of the Master Plan was that those are the main areas that DMSO needs to address and that the list was not all-inclusive. Therefore, those categories should be and are included in the developed taxonomy.

It was decided that no subject matter experts for UNIT PERFORMANCE were present at the meeting, so discussion on that category was tabled to the next meeting. Cathy Corland will talk to people at TRAC to get a clearer understanding of this category.

The TEST category was renamed to TEST RESULTS. It was felt that this title better described the contents of this category. Some discussion occurred on exactly what was meant by MEASURED vice SCIENCE AND TECHNICAL. An example for MEASURED was the utilization of an actual tank in tests to determine if it meets certain performance levels. SCIENCE and TECHNICAL was to cover those tests that used a simulator to determine whether certain performance levels are met. The results of that discussion led to the level 2 categories being renamed to MEASURED and ESTIMATED. It should be noted that the ESTIMATED subcategory title may be changed.

Under FORCE DESCRIPTION, the group decided that an enumerated listing of what the various services and the Intell community use would be provided. Representatives of the various areas provided input needed.

HUMAN FACTORS concerns the "man in the loop" factors. In the DoD Modeling and Simulation Master Plan, categories were listed under "Behavioral Categories" (see footnote 14 on page 4-12). These categories were suggested for use as level 2 categories under HUMAN FACTORS. One of the Army representatives preferred the use of ENVIRONMENT, EQUIPMENT, and OTHER for level 2 categories, feeling that these were more in line with the definition. A "final" decision will be made at the next meeting.



## B. Status of the Data Sources Directory Survey

A new directory was distributed at the meeting. Revisions are requested as necessary. Please notify Mike Hopkins if you have any changes.

We are awaiting more information from NASA. Also needed is information from DIA and the Navy and Marine Corps Logistics arena.

Mike Hopkins is coordinating with Pete Valentine on selecting a DBMS for this directory. Currently, ACCESS is the DBMS of choice.

The long range goal is to go to the people identified as POCs and obtain more information on the major data files, e.g., data element dictionaries (DED). This provoked major discussion on releasability issues. It was finally decided that the data file information would be limited to distribution within the DoD only until releasability issues for primarily the Navy and the Intell community can be addressed and resolved. A supplemental form will be designed for the data file information based on what FGDC used to obtain information for spatial metadata.

Discussion also ensued as to what data should be included in this directory. At one point, it was to contain only the data sources/centers considered to be the authority for that data. However, since the term "authoritative data source" was not clearly defined, it was decided to accept all inputs and not limit it to authorities in the various area. It was pointed out that this could be a large volume of information and that some sort of constraint should be made. The counterpoint to this was that multiple agencies may think they are the only authoritative data source/center or that there could be cases where an agency may be the only source for a certain type of data but was unaware of that. This data call could then ferret out those centers for use by the modeling and simulation community.

## C. Taskings of the Authoritative Data Sources Subgroup

The purpose of this subgroup is to enable M&S users and/or developers to quickly know where to go for valid, timely, VV&Ced (quality/documented), authorized data that is managed according to the guidelines and for those users to receive service according to the guidelines. Five subtasks were listed at one time for this subgroup:

- (1) Finalize taxonomy for authoritative data sources
- (2) Develop a data model for Authoritative Data Sources and implement and manage in the DMSO repository.
- (3) Populate this directory through Component representatives and by an OSD survey.
- (4) Identify the responsibilities for data centers, authoritative data sources and users.
- (5) Define how classified data centers can exchange data with other centers and release data to users. Address data aggregation and release authority issues.

Subtask (1) Will continue to be addressed and agreed to among the subgroup members.

Subtask (4) It was decided that the result of Subtask 4 would be a recommendation to DMSO on what the responsibilities should be. Each of the services would be contacted to obtain their viewpoint. LEVEL OF EFFORT: not determined at this time

Subtask (5) Has since become an issue for the newly formed Security Subgroup which will be meeting on December 14, 1994 at IDA. Subtasks (2) and (3) have been reworded as follows:

- (2) Develop a Data Source Model for the Authoritative Data Source Directory.  
PURPOSE: (1) to enable the M&S community to quickly locate possible sources of data and obtain a general understanding of the types of data for further research and reuse; (2) to facilitate the submission of data elements for candidate data standards; and (3) to facilitate the linking of databases.  
GOAL: to produce a data source data model that will provide the architecture for obtaining and populating an Authoritative Data Source Directory.  
LEVEL OF EFFORT: 12 person months
- (3) Implement, populate, manage, and maintain a data source Directory in the DMSO repository as modeled.  
PURPOSE: to provide the M&S community with a populated directory of possible data sources/centers.  
GOAL: populate the data source directory as modeled in subtask 2.  
LEVEL OF EFFORT: 12 person months plus 4 months per year maintenance

#### D. Other Business

Bill Dunn said that the Army Modeling and Simulation Management Office has undergone a restructuring. As a result of this, Lana McGlynn has assumed the duties of the functional side for data and would therefore be representing AMSMO in future meetings. Bill tendered his resignation as co-chair of this subgroup and nominated Lana as his replacement. Chien Huo will check with the DMSO for confirmation. We thank Bill for his dedication to this task and for his leadership and organizational skills.

The NEXT MEETING is scheduled for the morning of December 15, 1994 at IDA.

## 12.5 ACTION ITEMS

### A. Taxonomy

**Steve Boyd:**

ENVIRONMENT Category - SPACE/UPPER ATMOSPHERE breakdown;  
coordinate with Lana McGlynn (Army - AMSMO) and LCDR George  
Flax (Navy- SPAWAR)

**Cathy Corland:**

SCENARIO Category - "tighten" definition; coordinate with Bob Hartling  
TEST RESULTS Category - definitions and level 2 and level 3 breakdowns  
UNIT PERFORMANCE Category - definitions and level 2 breakdown

**Dave Danko:**

ENVIRONMENT Category - TERRAIN breakdown and definitions  
ENVIRONMENT Category - NAVIGATION breakdown; coordinate with  
Eleanor Schroeder and Lana McGlynn

**Bob Hartling:**

SCENARIO Category - "tighten" definition; coordinate with Cathy Corland

**Mike Hopkins:**

FORCE DESCRIPTION Category - Identify Navy's term equivalent to TO&E,  
TO, TE, and TA

**Lana McGlynn:**

ENVIRONMENT Category - NAVIGATION breakdown; coordinate with Dave  
Danko and Eleanor Schroeder  
ENVIRONMENT Category - SPACE/UPPER ATMOSPHERE breakdown;  
coordinate with Steve Boyd and LCDR Flax

**Eleanor Schroeder:**

ENVIRONMENT Category - OCEANOGRAPHIC breakdown  
ENVIRONMENT Category - NAVIGATION breakdown; coordinate with Dave  
Danko and Lana McGlynn

### B. Data Source Directory Survey

**Dave Danko:** Create a supplemental form for the data file information

**Mike Hopkins:**

- (1) Get input from Navy Logistics
- (2) Coordinate more Army Logistics input with Lou Ferris/Susie Glick
- (3) Coordinate Marine Corps Logistics input with MAJ Steve Zawitz
- (4) Get more input from NASA
- (5) Contact new potential sources such as US Coast Guard, CAA, MTMC, OSD  
PA&E, and some of DOD's MAGA data centers

**Chien Huo:** Get DIA input

**ALL OTHERS:** Review latest draft; notify Mike Hopkins of changes, if any

### C. Taskings

**Mike Hopkins:**

- (1) Work with Iris Kameny on approach to subtask 2
- (2) Develop strawman for subtask 4
- (3) IAW JDBEs Gary Lambert, research the M&S Data Repository design model

**Iris Kameny:** Work with Mike Hopkins on approach to subtask 2. Iris is concerned that the information in the Authoritative Data Sources data model will overlap so much with the existing Databases Directory Data Model that there isn't a need for both directories. Mike, Gary and Iris will examine this issue and make a recommendation to the Subgroup.

**Cozy Bailey:** Determine whether the C2 Core Data Model is integrated into the DoD Data Model. (This arose as a result of discussion for the Complex Data Task Force subtask of modeling CFDB/MSDS to the C2 Core Model.)

D. Other

**Chien Huo:** Present Lana McGlynn's nomination as co-chair for the Authoritative Data Sources Subgroup to DMSO for confirmation

**Iris Kameny:**

- (1) Add Mike Hopkins and Dave Danko to Repository Subgroup's mail list
- (2) Redraw charts IAW new

## 12.6 APPENDICES

### A. Suggested Taxonomy for Data Sources Directory:

1. FINANCE:  
    <subcategories to be determined>
2. ENVIRONMENT:
  - a. Terrain
    1. Boundaries
    2. Elevation
    3. Hydrography
    4. Industry
    5. Physiography
    6. Population
    7. Transportation
    8. Utilities
    9. Vegetation
  10. Surface Materials
  - b. Oceanographic
    1. Acoustics
    2. Bathymetry
    3. Biologics
    4. Geology
    5. Gravity
    6. Geomagnetism
    7. Sea Surface
    8. Water Column & Currents
  - c. Weather, Obscurants & Man-Made Conditions
    1. Seasonal
    2. Daily
    3. Day/Night
    4. Man-Made Conditions (e.g. smoke)
  - d. Space/Upper Atmosphere  
    <subcategories to be determined>
  - e. EM  
    <subcategories to be determined>
  - f. Navigation
    1. Obstructions
    2. Landmarks
    3. Non-electronic
    4. Inertial
    5. Radio
    6. Satellite
3. EQUIPMENT:
  - a. Equipment Characteristics
    1. Air Vehicles
    2. Land Vehicles
    3. Sea Vehicles
    4. Space Vehicles
    5. Monitors
    6. Electronics
    7. Sensors
  - b. Equipment Performance
    1. Air Vehicles

2. Land Vehicles
3. Sea Vehicles
4. Space Vehicles
5. Missiles
6. Electronics
7. Sensors
4. FORCE DESCRIPTION:
  - Army: TO&E's (Table of Operation and Equipment)
  - Marine Corps: TO/TE (Table of Organization/ Table of Equipment)
  - Air Force: TA (Table of Authorization)
  - Navy: <to be provided>
  - Intell: foreign
5. POLITICAL:
  - a. Demographics
  - b. Policy
  - c. Economics
6. HUMAN FACTORS:
  - a. Sensory
  - b. Perception
  - c. Physical
  - d. Cognitive
  - e. Social
  - f. Emotional
7. SERVICE SUPPORT:
  - a. Logistics
  - b. Medical
  - c. Personnel
8. SCENARIO  
<Subcategories to be determined>
9. TEST RESULTS:
  - a. Measured
  - b. Estimated
10. TTP COGNITIVE:
  - a. Tactics
  - b. Operational
  - c. Doctrine
  - d. C3I
11. UNIT PERFORMANCE:  
<subcategories to be determined>
12. MISCELLANEOUS:
  - a. Data Standards

**13.0 DATA SECURITY REQUIREMENTS TASK FORCE MEETING NOTES,  
DECEMBER 14, 1994**

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## 13.1 AGENDA

WEDNESDAY, DECEMBER 14, 1994

- 0830 - 0900 Introduction: Dr. Chien Huo (DMSO)  
Ms. Teresa Lunt (ARPA/CSTO)
- 0900 - 0930 Needs for Data Security Requirements: Ms. Iris Kameny (RAND)
- 0930 - 1050 Some Specific Needs from the Services:
1. Mr. Howard Haeker (Army TRAC)
  2. LtCol Dan Hogg (Joint Staff)
  3. Mr. Mike Hopkins (CENTCOM)
  4. Maj. Steve Zeswitz (USMC)  
(presented by Steve Galloway)
  5. Ms. Lana McGlynn (US Army)
  6. LCDR Bruce Stewart (US Navy)  
(presented by LCDR Don Hagerling)
- 1050 - 1110 Break
- 1110 - 1140 Data Interoperation: Dave Gunning (ARPA)
- 1140 - 1210 Database Security Technology: Mr. Tom Haigh (SCC)
- 1210 - 1240 Working Lunch
- 1240 - 1310 Data Inference: Dr. Xiaolei Qian (SRI)  
(presented by Teresa Lunt)
- 1310 - 1340 Data Aggregation: Ms. Catherine Meadows (NRL)
- 1340 - 1410 Data Integrity: Ms. LouAnna Notargiacomo (MITRE)
- 1410 - 1430 Break
- 1430 - 1630 Discussion
- 1630 - 1700 Wrap-up: Dr. Chien Huo (DMSO)  
Ms. Teresa Lunt (ARPA)



### 13.2 ATTENDEE LIST

#### DATA SECURITY REQUIREMENTS TASK FORCE MEETING WEDNESDAY, DECEMBER 14, 1994

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# 13.2 DECEMBER 14, 1994 ATTENDEE LIST (Cont'd.)

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### **13.3 MAIN OBJECTIVES OF MEETING**

This was the first meeting of the Data Security Requirements Task Force of the DMSO Data and Repositories Technology Working Group (DRTWG) co-chaired by Dr. Chien Huo, acting M&S Functional Data Administrator, and Teresa Lunt, the Program Manager for Information Security at ARPA/CSTO. The objective was to familiarize people working in information security with the data security needs of the DRTWG community in order to address those needs in a new ARPA information security program that Lunt will be forming.

## 13.4 MEETING NOTES

### **Dr. Chien Huo: Presented DoD M&S Needs for Data Standardization**

He reviewed the DoD M&S management structure, the data challenges, ongoing activities of the Data and Repositories Technology Working Group (DRTWG), action plans, the M&S data administration road map and the status of the M&S Master Plan and the place of data and data issues within it. In particular, the DRTWG has identified community needs to include: a distributed M&S Resource Repository (MSRR) system, data standards for complex data, data verification, validation and certification, identification of authoritative data sources, and determining data security requirements. Huo also distributed a memorandum signed by CAPT James Hollenbach, Director of DMSO, defining the Terms of Reference for the DMSO M&S Data Security Task Force. This provides a charter for how the TF shall operate. He asked for comments on the charter be returned to him no later than January 14, 1995.

### **Ms. Teresa Lunt: Meeting Objectives**

Lunt discussed the meeting with respect to the new ARPA security program she will be starting up. She invited security people to the meeting to listen to the M&S data security problems and noted that they were attending on their own since there is no current ARPA program. Most of the security people work in research, some on developing products.

Terry Mayfield identified himself as an IDA employee working in the security area that had been asked by DMSO to attend the meeting and could be a contact point in addressing some of the issues.

### **Ms Iris Kameny: Briefed on M&S Security Issues**

DMSO had sent out a white paper covering these issues prior to the meeting. An issue not explicitly covered in the white paper was the fact that the solution of most of the issues will require policy development/changes as well as technology. It was noted that the current world is very different from the cold war world during which much of the current security policy was developed. Currently, DoD needs to be able to quickly put together Joint Task Forces for deployment to many parts of the world, with little notice, and to address many situations other than war. Modeling and Simulation plays an important role in these new operational missions since it can be used to train, to rehearse, to address what-ifs, etc. This requires interoperability of forces and M&S representing those forces that requires sharing of data across organizations that have always held their data close and protected it. We need to face the issue of interoperability (requiring data sharing) versus the need to protect data. Consistent policies are needed across DoD (and probably the federal government) to protect, release, and downgrade data. Attention also needs to be paid as to whether different policies should apply in peacetime and in crisis and if so, what implication does this have for the DoD desire "to train as we fight" and "fight as we train."

(With respect to policy issues, it was said that William Moss supports Mr. Davidson (DIA) and that Marty Pickens is in the DISA/CISS policy office.)

Nine M&S security issues were discussed. The first seven dealt with data security and the last two with Distributed Interactive Simulation (DIS) security needs. The nine issues are:

1. Data exchange
2. Data access
3. Data aggregation
4. Classification of enumerated values
5. Protection of data source in downgrading data
6. Releasability of data/information
7. Standardized security labels

8. Multilevel secure DIS exercises
9. DIS component participating in exercises at different security levels

A question was asked about how the recent Synthetic Theater of War - Europe (STOW-E) exercise that utilized DIS was accredited since its components operated at different security levels.

**Mr. Howard Haeker:** Director of the TRAC Automated Data Center (TADS) discussed issues with respect to furnishing unclassified data

TADS currently contains only classified data, yet Haeker receives requests for him to change classified data to unclassified data for some exercises. The issues include:

- How to convert classified data to unclassified data
- Releasability to foreign countries (i.e., he may be allowed to release a model or simulation but not the data that the foreign country needs to run the software)
- Acquiring, gathering and maintaining classification labels of data sometimes at the data element level: this will require extensive metadata but right now isn't done. Organizations currently put a broad caveat on their data saying it is all secret, or all no foreign or all no contractor, etc. requiring time consuming activity to get exceptions.
- Releasability of unclassified data is a problem because it falls under technology transfer policy/regulations preventing it from being released to foreign nations.
- The releasability problem can also be extended to the protection of information for proprietary reasons.

**LtCol DAN HOGG: Briefing on Data Security Issues From the J8/OASIS Point of View**

The Joint Staff need was to share Secret data across the CENTCOM Conventional Forces Database (CFDB) and J8's Operational Analysis and Simulation Interface System (OASIS). CFDB is at the Secret system high level and OASIS is at the Top Secret system high level though the majority of its data is individually classified at the secret level. The objective was to migrate the OASIS Top Secret high configuration to one supporting multilevel operations. The migration (1) would segregate data available to users with S and TS clearance levels using mandatory access controls, (2) support client/server Ingres applications using Sun workstations accessing Sequent data servers, (3) support existing single level applications, and (4) support eventual access by Secret users via a secure WAN to the CFDB. The approach was to upgrade the Sequent servers to Secure PTX version 2.1. One copy of Ingres and Ingres/Net with two DBMS server processes runs under Secure PTX, one server runs at Secret and the other at Top Secret. The Ingres installation at TS contains the full OASIS database (Top Secret data and a redundant copy of the Secret data). The Ingres installation at Secret contains only Secret data. The Ingres Replicator synchronizes the replicated copy of Secret data in the Top Secret server with the data in the Secret server serving as a one-way write-up trusted process. Another way to have done this was to use a firewall to physically separate the two servers and to have hooked them up only when needed for writing-up.

An identified issue is that the data has to be tagged for security and for audit trail, which will increase the database size a little or a lot depending on the granularity size of the data being tagged (e.g., table, row, or individual data value level). How do you address this trade off?

Another issue is that of filters. DIA wants to put out a generic data product on 21 tapes and let users filter out what they need but OASIS would like the filtering to be done by the producer and not the user. They would like to be able to request only the data they want. DIA has a MIDS tool to filter data but it operates only at the SCI level. Question is where should filters reside?

Another issue has to do with labeling and releasing data. They need a document to tell them how to label data, handle it at different levels, etc.

Lastly, where do they go for information about how to release data to foreign countries? They also have a problem in that the M&S may be releasable but do foreign analysts no good without the accompanying data.

**Mr. Mark Hopkins: CENTCOM Issues**

MOP 60 and a recent CJCSI on joint policy boils down to a need-to-know. There needs to be a way to determine who has a need-to-know so data can be made available to them. MOP 60 is very general/generic and mainly deals with handling WWMCCS data and is mainly used as a reason for denying service.

OPSEC/aggregation: refers to fact that force data is mainly unclassified but the aggregation of it forces an upgrade to secret classification.

There is also concern about how to handle or get exceptions to the no foreign and no contract caveats.

Title 10 tries to enforce separation of service data from DoD data, i.e., makes service data unavailable to DoD. This has a great affect on sharing data for M&S.

**Steve Galloway (for Major Steve Zeswitz (USMC)): Discussing the Needs of the Marine Corps M&S Office**

There are no data security issues the Marine Corps has that have not been discussed here already. They have had to run their information systems at system high to prevent dealing with multilevel security. The current problem is that no one wants to do M&S classified, people want others to give them sensitive data and just let them use it in an unclassified game/M&S. If you don't know the source of the data and how it was produced (e.g., downgraded) then questions will be asked because the outcome of simulations will be strange. The war colleges, agencies, etc. are beginning to operate at Secret across Services as the safest bet. If you look through Security documents you will find standards for markings etc. but they have been designed for people working on manual systems as well as automated ones.

If we are to use filters for downgrading data, then we need standards in the form of central baseline operating procedures to ensure correct use. He mentioned lessons learned from TRADOC and DIA as data is migrated. The no contractor caveat is a problem because if a contractor is implementing a simulation or doing analysis he not only needs the data but he may need to know what its source was and how it was derived.

There is a data aggregation problem.

With respect to data release, the Freedom of Information Act (FOIA) has resulted in the press, authors, etc. making requests for data/information that the Services would normally protect or at least hold close because of lack of need-to-know but FOIA ends up turning this around and forcing them to defend not releasing the data.

**Ms. Lana McGlynn: Army Modeling and Simulation Management Office**

Suggested that the starting point in all of this is to find out what policy currently exists, and since it isn't all broken (i.e., bad) find out what is broken and address those problems.

The Army has regulations (e.g., A-380-5 on Information Systems Procedures and AR5-11 on M&S and associated data) that address many of these issues. Mr. Hollis has release authority for all M&S and M&S data in the Army. There should be similar policy available in the other Services and at the OSD level. Why don't we start there?

With respect to protecting data from release to contractors, what are the policy restrictions that need to be enforced upon contractors to whom data is released by exception?

We also need to look at releasability policy in moving from data to information and to intellectual property rights.

**LCDR Don Hagerling (N643) (for LCDR Bruce Stewart): MLS Requirements for C3I Database Managers: The Challenge to Protect Navy Information Resources**

The Navy is leveraging the use of people through the use of distributed systems. The best ADP practice is to transfer functions from people to information systems. Navy Information Systems will have to be MLS and there needs to be automated transfer of information at the proper level. The risk/vulnerability is increasing as more people gain access through connectivity and more machines are interconnected. This briefing was put together to educate the operational commander.

MLS databases are important because the heart of any C3I system is the Database Manager (DBM), that is where we are trying to automate the complex human function, and most DBMs are immature. He went over the definition of a trusted system, and assurance (an art not a science), and discussed certification and accreditation.

He discussed the TAMPS security requirements: used to plan missions of varying sensitivities; used by users with different clearances and need-to-know; data storage units (DSU) are reused; will contain software and data that is classified, database updates are received from different systems at different security levels (U to S); databases will contain information at varying information classification levels; classified data and unclassified or confidential maintenance data may be written to the DSU during a mission. He went over security architecture options (MLS LAN, MLS database servers, MLS workstations, MLS front ends). He reviewed the Navy development of MLS functions for OSS and discussed the phase 5 of insertion of trusted technology in OSS, which is when security properties are fully integrated and supported by certification evidence.

They would like to automatically release and downgrade data but need enforceable rules for addressing data aggregation and data inferencing.

He believes they need mandatory access control (MAC) at the data element level requiring element level labeling because row level labeling is too large a granularity.

He mentioned three needs, for: (1) handling time/event sensitivity, (2) trusted object oriented RDBM, and (3) trusted synchronization methodology that can separate class and accuracy. Synchronization is a Navy problem because of limited bandwidth. Synchronization between levels of classification: higher classification does not necessarily mean higher accuracy (need to deal with poly instantiated data).

The Navy does have rules for aggregation: data describing 1% of the force capability is labeled unclassified, 10% confidential, and 50% Secret.

The Navy needs protection against inferring the location of ships and about inferring bomb damage. They are addressing this by looking at a MAC query manager that will classify predetermined C2 queries (while all ad hoc queries will run at high level mark).

The DBM is critical, must be distributed and MLS, but is too immature to be part of a current MLS system.

They are working with DISA on data labeling, and mentioned George Mitchell at NSA and Tom Bartee at IDA who is the Navy representative to the National Committee for Information Security.

**Dave Gunning (ARPA): Intelligence Integration of Information (I3)**

The DRTWG has been following Gio Wiederhold's program in the development of many of these ideas over the past several years since Gio is a member of the group. Gunning gave us a very well prepared briefing which focused on the critical issues and techniques.

The technical issues are: summarizing information, resolving heterogeneity, living with legacy systems, and establishing infrastructure in the form of interchange protocols and modular architecture.

The approach to information integration is composed of three parts: use of domain-specific mediators (utilizing domain knowledge to integrate data), use of information interchange protocols (example of KQML providing a protocol for agent communication) and use of wrappers and standard interfaces.

There are a number of current I3 research applications and testbeds, including a ACPT Target Query Mediator which is a model-based mediator; Genie: broker of satellite data; CoBase which deals with approximate queries; and the National Industrial Information Infrastructure Protocols (NIIP) which is developing a NIIP architecture.

Currently, the mediators are hand-built and seem to work well for relational and object-oriented DBMSs but in the future we need automated tools to help in their construction.

Future directions include: expansion to cover unstructured data; improved development tools (e.g., reference architecture for information integration, mediation and wrapper toolkits and automatic generation techniques); and enhanced application demonstrations.

Teresa Lunt said that she has done work on describing security policy for heterogeneous sources. One could see a possibility for each M&S data center to have a mediator that knew about its data and security policy and a mediator of mediators to enforce security policy between data centers via their respective mediators.

The I3 effort could be applied to the M&S Resource Repository system need for common tools for resource exchange and should be looked at more closely by the DRTWG Repository Subgroup.

**Tom Haigh: Database Security Technology**

Tom works for Secure Computing Corporation which was originally a part of Honeywell and has develop the Lock DBMS (based on trusted Oracle) and an authentication/identification product called LOCKOUT.

Database security research directions are toward: tools for defining MLS DBs with inference protection; tools for installing MLS DBs; understanding what real users need (e.g., data model issues of granularity of labeling and integrity across levels, and query language); support for trusted transactions; architecting for assurance; and addressing the interplay or trade off between secure DBMS and distributed DBMS concepts.

Tom went over some architecture issues such as the handling of replicated and or fragmented data in a MLS and assurance issues such as security policy, the design and placement of security mechanisms and the implementation of mechanisms. He discussed labeling at different granularity levels and the different problems at the different levels and the differences in approaches. For example, when labeling at the data attribute level, examples were given of including attribute labels in the extended key (SeaView) or including a "maintenance level" in the extended key (LDV approach used by TRANSCOM GDSS).



He discussed the trusted subject, where the DBMS sitting on top of a secure operating system, enforces MAC and DAC (examples are Informix, Oracle, and Sybase) using row level labels with common disk for storage of data at all levels.

He showed a physically distributed architecture where the user workstations were at different security levels (could be on LAN) interfacing to a server which has a common operating system which interfaces (again could be over a LAN) to DBMSs at each security level, each running on top of a operating system that interfaces to a disk, with a separate configuration of DBMS/OS/DISK for each security level and data replication of lower level data in the higher level. This type of architecture is found in SD-DBMS (Unisys) and SINTRA (NRL).

He showed a partitioned approach where each secure DBMS is at a single level connected to a workstation at the same level (could be over a LAN) with the DBMSs connecting to a data server consisting of an operating system and a single disk containing data at all security levels. This is the approach used by Sea View, LOCK Data Views, Oracle-OS MAC mode, LOCK DBMS.

Assurance requires a threat model specific to the operating environment, policy that addresses all identified threats, analysis of the totality of mechanisms as designed to enforce the policy, and testing to be sure each mechanism is implemented correctly.

#### **Ms. Teresa Lunt for Dr. Xiaolei Qian: Data Inference**

Inference occurs when a low user can infer high information for the low data he is allowed to see. An inference channel is a chain of relationships that allow high information to be inferred from low data. Inference problems can result from incorrect labeling or inconsistent labeling. The general problem is unsolvable since its solution would require representing everything a user can be expected to know and would require an unlimited amount of reasoning about the sensitive implications of that knowledge.

DISSECT is a system of detecting and eliminating inference channels by performing schema-level analysis rather than data-level analysis and can be performed during database design or redesign. It uses foreign key relations and relationships involved in indirect inference (e.g., type overlap relationships and near key relationships).

Compositional channels are detected through realization that the database represents a set of foreign key relationships at different security levels that can be composed to form new relationships or paths. The security level of a composed relationship or path is the least upper bound of the security levels of the links in the path. If two paths of different security levels connect the same end nodes, then there may be a compositional inference problem.

Near-key relationships allow "almost exact" inferences about dependent attributes and may contribute to inference problems caused by a user's ad hoc queries that the data designer might not have considered. When two attributes share the same type and overlap in allowed security levels, they are joinable and may contribute to inference problems also caused by user's ad hoc queries that the data designer might not have considered.

There is a potential inference problem if: there is a pair of different-sensitivity paths between the same two entities, the high path consists of a sequence of foreign key links, the low path consists of both foreign key, type overlap, and near-key links.

Repair detected problems: by upgrading the security level of some of the relationships. Several low-cost solutions may be presented in the analysis and the users may choose all or part of a presented solution (e.g., for a partial solution, it is possible to identify specific tables for data-level monitoring).

An example of a 50-table database taken from a USAF air-mission planning database had 14 potential inference channels which were displayed in eight concise diagrams.

Future work is to evaluate the severity of the detected channels and to adapt DISSECT use with row-labeled databases.

A prototype DISSECT tool is available.

**Ms. Catherine Meadows: Data Aggregation**

Aggregation arises when a collection of data is classified at a higher level than its components.

Three types of solutions have been proposed:

1. Store collection at higher level and selectively downgrade keeping a record of past requests so nobody is given more data than they are authorized to see. Drawbacks: covert channels in downgrading process, and pooling of data.
2. Store collection at lower level and release selectively to those who request data keeping a record of past requests so nobody is given more data than they are authorized to see. Drawbacks: data aggregate not given full protection by MLS system, and pooling of data.
3. Similar to second solution but provide intermediate security labels to components with the intermediate levels dominating the lower level but being dominated by the higher level. Also include rules to compute labels on aggregates from labels on components and keep requests so that nobody is given more data than they are authorized to see. Drawbacks: may not be practical for large aggregates of low granularity data, using intermediate labels may require modification to the system, and pooling of data.

Discussed situation about five years ago when different versions of the solutions existed but it was difficult to know when to apply which one. Evaluation of use of solutions was difficult because of lack of examples. We need a more informative characterization of the aggregation problem or enough examples of different types of problems that such a characterization can be constructed. A strategy is to develop a set of questions about different aspects of aggregation problems, construct profiles of aggregation problems by applying the questions to each one and study the profiles to develop a characterization/taxonomy of the aggregation problems.

She presented some questions to ask about aggregation problems:

1. What is really being protected?
2. What assumptions are we making about collusion?
3. Does the information being protected change over time?
4. Who is likely to access what? Can we predict it?
5. Dependency among aggregate components.
6. Who is requesting the accesses?
7. Does data originate at the low or high level?

Seven more questions about the relevance of questions:

1. Is it an aggregation problem at all?
2. How much data do we give a low-level individual permission to see?
3. Relevant to time intervals used in permissions.
4. If we can predict who will make the accesses, we may not have to model it as an aggregation problem.
5. If Y is dependent upon X so that information about Y reveals information about X, then access to Y implies access to X.
6. Degree to which the requester is trusted may affect risk involved.
7. Relevant to how much protection we can expect to give data.

Meadows went through six examples and suggested some further questions such as:

- What profiles do aggregation problems fit? Are there particular profiles that are more preponderant than others?
- How complete/useful is the list of questions? How can they be modified/added to?
- What are good examples of aggregation problems that can be used to construct profiles?

**Iris Kameny:**

1. I have reproduced Meadow's briefing almost verbatim because aggregation is a critical issue for the M&S community since we are in the process of compiling warehouses of data. The other side to releasing the data in a protected way is how to realize when ad hoc or new data collections need to be protected at a higher classification level.
2. I will be the point of contact in the M&S community for collecting examples of suspected aggregation problems. Also send me examples of new data warehouses and how the aggregate label is being determined. This should also be a DIS issue when large amounts of data are aggregated even temporarily for an exercise. I would appreciate it, if when you send me examples, you could take the time to try to answer the questions Meadow's has suggested.

**LouAnna Notargiacomo: Data Integrity**

There are four relational model integrity rules:

- Entity integrity - no component of a key is null
- Key uniqueness - each entity must have a unique identifier
- Domain integrity - values for an attribute are constrained to be within the defined domain
- Referential integrity - relationships maintained between primary and foreign keys

There is a conflict between integrity and multilevel security with relation to key uniqueness, domain integrity and referential integrity. In MLS environments objects may be labeled at different security levels and higher-level actions should have no impact on lower-level objects. (Some of these problems were discussed previously by Tom Haigh.) Trusted DBMSs provide options to allow application developers choice of security vs integrity.

A key uniqueness and polyinstantiation problem occurs when the key does not include the object's security level. MLS DBMS products that allow for either choice are Oracle and Informix, Sybase supports trusted stored procedures to allow the application to make the choice.

Domain integrity is handled by labeling integrity constraints at the level at which they are created. Enumeration of higher level values or sensitive constraints must be labeled high and higher level constraints cannot be used to control lower level operations due to the inference problem.

Referential integrity constraints can be defined to control relationships between objects at different levels and rules can be defined to either cascade or disallow updates or deletes in order to maintain the correct state. Some MLS DBMSs prohibit the modification of a low object due to a high operation to prevent an illegal channel.

MLS DBMSs provide options for use of trusted trigger and stored procedures to enforce more complex application-specific integrity rules that have cross-level dependencies. Sybase Secure SQL Server provides the ability to define a security level execution range for a trigger or stored procedure.

Concurrency control locking procedures can generate illegal channels. Solutions are multiversion time-stamp ordering and soft locking. (Sybase ignores the problem, Oracle uses multilevel locking, and Informix soft locking.)

The Clark Wilson integrity model addresses business rules and labels objects with an integrity designation such that constrained data objects (CDIs) are integrity-protected and can only be

modified through certified transformation procedures and unconstrained data items (UDI) are unprotected. Transformation procedures can transform CDIs from valid to valid state or UDIs to CDIs. Enforcement of integrity is through user, transformation procedures, and use of constrained data objects; authentication of user; and audit of transformation procedure events.

MITRE has developed a model for Clark-Wilson integrity within a trusted DBMS environment and found that the C-W integrity policy enforcement could be added to MLS DBMS without interfering with multilevel operation. The Sybase Secure SQL Server supports Clark-Wilson and Informix is exploring the development of such a capability.

(Note from Iris: We should look at this as a formal basis for enforcing data quality within data centers.)

In summary, a fundamental tradeoff exists between integrity and security. MLS DBMS products allow application developers to configure security vs integrity enforcement.

#### **Discussion:**

John Griffiths: Announced that the Intelligence Community M&S Directory will be in two parts: unclassified and classified. The unclassified part will reside at DMSO. They have developed a security model on how they will manage both directories on the same machine within the IC.

Discussion of world wide web support for classified M&S data center home pages. People would like to find out how the IC did INTELINK and government employees are permitted to attend demonstrations and perhaps glean lessons learned and some insight into handling the secure data center issue. Janet Morrow will furnish a POC.

Mike Hopkins: J6 had a contractor do a study on MLS with respect to use of a TS LAN and a S LAN. Contact him for information.

An NSA program office that was previously part of the NCSC supports research into database security, information system security, intrusion detection, operating system security, network security, etc. There is a problem in identifying real customer needs. Most funding is being spent on long range issues. The point of contact is Nick Piazzola. The MISSI (Multilevel Information System Security Initiative) program is developing commercial products that will be available to DoD. Don Marks said there are a whole set of security products available and that we could get a briefing on them at the next meeting.

Discussion about M&S community needing access to classified data and information and CALS needing access to classified images of vehicles.

We discussed the enumeration document and the need for wide distribution of the classified version: Can we do something about this?

Ron Hofer - policy: Suggested that we group issues into technology issues and policy issues, the latter of which the group cannot address. Iris' view is that the two areas overlap and we can take the need for policy changes up to the DMSO Director and the EXCIMS where they could be sent up the chain at DoD. Jim Augins suggested that we be briefed on existing security policy and procedures of various DoD Components.

Discussion led by Howard Haeker: What to do about request for de-classified data. There is a need for filters and sanitization guidance. Can we come up with sanitization methods? If, through data de-classification, the environment for operational use and M&S use becomes fuzzy, then there are problems for training and other uses of M&S. It may be a question of making an entire environment protected. An issue is whether we can do adequate mission

rehearsals with unclassified data. Another issue is that most classified data is denied to contractors but contractors need the data and information about the data in order to build classified M&S that can be verified, validated and accredited (VVC).

Mike Williams: Suggested that there is a standard way of labeling classified data and will report back on this.

Connie Davis: We need to define the scope of the issues this group will address with respect to information security and the role of data administration in information security. She said that every automated system has a published guide at DTIC that tells exactly why its data is classified, its sources, etc. She also has DISA issue papers dealing with data security and data administration. She gave Chien Huo a copy of a document on policies and procedures produced for DISA by SAIC and also referred everyone to Volume 6 of the TAFIM which addresses security.

George Hurlbert: Gave short briefing on TECNET's plans for multilevel security using a MLS host. They are working with NSA to put together a Concurrent Systems Security Engineering (CSSE) process. The team meets one week during the month. They are addressing whether procedures can be developed to mitigate shortfalls in hardware and software. Their MLS approach deals with flat files controlled at the operating system level and across interconnecting machines. They won't do MLS wrt data until they can label at the data element level.

### 13.5 WRAPUP

1. Next meeting will be at IDA on Thursday, February 9 from 8-12
2. We need a strawman document for requirements for M&S data security
3. We need to evaluate and understand current DoD Component security policy and procedures to determine where they are inadequate.
4. Iris Kameny suggests that some of the security people at the meeting may want to make contact with the M&S people with problems in view of addressing those problems in the ARPA future BAA for Information Security proposals.

### 13.6 ACTION ITEMS

**Attendees:**

1. Return comments about the Data Security Requirements Task Force charter to Chien Huo by January 14, 1995
2. Return examples of downgrading data to Iris Kameny

**Howard Haeker:**

1. More on defining and addressing issues of declassifying data through filters, sanitization methods and techniques

**Iris Kameny:**

1. POC to provide information on data aggregation problems
2. Address object architecture with Ron Hofer and Janet Morrow

**Teresa Lunt/Chien Huo:**

1. Arrange briefing from NSA on current available security products (re suggestion from Don Marks)
2. Briefing suggested on physical security for next meeting
3. Arrange briefing from Louis Anderson, OSD/CIM expert on releasability
4. Lana McGlynn will review and present Army security policy. Identify people and assign similar task to other services and relevant organizations such as DMA.
5. Terry Mayfield will brief on value of TAFIM especially Volume 6 at the next meeting

**Lana McGlynn:**

1. Review Army security policy and present at next meeting

**Janet Morrow:**

1. Work with Iris Kameny on object architecture
2. Get POC to INTELINK Standards Committee to Chien Huo

**LouAnna Notargiacomo:**

1. Send information about index to security documents to Chien Huo

**Eleanor Schroeder:**

1. Report back on lessons learned from the Navy Integration Data Management System

**Mike Williams:**

1. Report back on standard way of labeling data

**14.0 AUTHORITATIVE DATA SOURCES SUBGROUP MEETING NOTES,  
DECEMBER 15, 1994**

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## **14.1 AGENDA**

**THURSDAY, DECEMBER 15, 1994**

- 0800 - 0830 Introductions and Administrative Remarks - Chien Huo, Iris Kameny, Mike Hopkins
- 0830 - 0900 DoD System Interfaces & Data Exchange - Ms Mary Polydys
- 0900 - 1000 Finalization of Categories/Taxonomy for JM&S Data Sources Directory - Iris Kameny, Dave Danko, Mike Hopkins
- 1000 - 1015 Break
- 1015 - 1200 Data Sources Responsibilities - Mike Hopkins
- 1200 - 1300 Lunch
- 1300 - 1400 Status of JM&S Data Sources Survey - Mike Hopkins
- 1400 - Adjourn

## 14.2 ATTENDEE LIST

### AUTHORITATIVE DATA SOURCES SUBGROUP MEETING AT IDA THURSDAY, DECEMBER 15, 1994

<u>NAME</u>	<u>ORG</u>	<u>FAX #</u>	<u>PHONE #</u>	<u>E-MAIL ADDRESS</u>
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### **14.3 MAIN OBJECTIVES OF MEETING**

The main objective of this meeting was to finalize the Authoritative Data Sources Directory Taxonomy. Several action items were assigned at the last meeting (3 November 1994 at USCENTCOM in Tampa, FL) and the results of these action items were to be presented at this meeting for incorporation into "version 1.0" of the taxonomy. Dave Danko had an action item to draft a "Phase II" format for the data sources survey and this was to be presented and discussed at this meeting. Lastly, a review of the responsibilities of data sources and data customers as defined by this group was to be finalized for submission to DMSO's MSWG. It should be noted that the taxonomy is still not finalized - detailed notes to follow. Also, the agenda was really a guideline and was adjusted as necessary.

VEHICLES, LAND VEHICLES, SEA VEHICLES, and SPACE VEHICLES. This would, in effect, broaden these categories to also include weapons. Thus VEHICLES and WEAPONS could be level 4 categories. Also MONITORS was removed and MISSILES was added as a level 3 category.

The ENVIRONMENT definition needs to be modified to include oceanography. See proposed definition in Appendix A. Discussion ensued on whether EFFECTS should be added as a new level 2 category. Richard Siquig said that many M&S users who need environmental data do not necessarily know how the environment actually affects their simulations. It was unclear whether databases exist that contain environmental effects. Although Mr. Siquig's point was well taken, it was decided that there was no feasible way to make the directory access using this taxonomy fool-proof. It was generally believed that subject matter experts would be involved in the simulation development process and that this directory would be of help to those people in finding the authoritative data sources that they would need to support their simulation. One of the major problems for the M&S community today is not so much not knowing how to use the data, but where to find the data. This directory (and hence taxonomy) is to solve this problem. Further evolutions of the directory could possibly include EFFECTS as a level 2 category. It was also noted that nuclear, biological, and chemical effects were not included as well as effects of obstacles. Under the level 2 category of TERRAIN, it was decided that SURFACE MATERIALS be modified to SOILS/SURFACE MATERIALS and POPULATION to POPULATED PLACES. Under WEATHER, it was decided to change SEASONAL to CLIMATOLOGICAL and DAILY to DIURNAL. The EM category was expanded to EM/EO (electromagnetic/electrooptical) and a proposed breakdown was provided to include NATURAL EMITTER CHARACTERISTICS, MANMADE EMITTER CHARACTERISTICS, RECEPTOR CHARACTERISTICS, COMMUNICATIONS/INFORMATION TRANSFER, and PROPAGATION EFFECTS. This breakdown was provided by Jim Hammond. NAVIGATION sub-breakdown was re-defined into OBSTRUCTION, LANDMARKS, NON-ELECTRONIC, INERTIAL, RADIO, SATELLITE, LIMITS.

The TTP COGNITIVE definition has a minor typographical error which will be changed. See corrected definition in Appendix A. Subcategory C3I was removed.

Under FORCE DESCRIPTION, the level 2 categories of JOINT FORCES and COMBINED FORCES were added.

In the definition for POLITICAL, the word "geography" will be removed. What was previously termed "geopolitical," e.g., political boundaries, are found under the TERRAIN subcategory of ENVIRONMENT.

No major discussion occurred concerning HUMAN FACTORS.

The word "combat" will be removed from the term portion of the definition of SUPPORT SERVICES. This will reflect the change made at the last meeting when COMBAT SUPPORT SERVICES was renamed. See Appendix A.

Cathy Corley presented a subcategory breakdown for SCENARIO. The subcategories presented and accepted were ARMY, NAVY, AIR FORCE, MARINE CORPS, JOINT/COMBINED, OPERATIONS OTHER THAN WAR, and PIECES (aka PLANNING GUIDANCE). These subcategories were determined to be adequate in order to define "scenario" as a description of a conflict, including who is involved, the equipment they have, locations, environmental and political constraints, guides as to how they are to fight, and the purpose of the conflict.

The term portion of the definition for TEST needed to include TEST RESULTS to reflect the "new" top level category as determined at the November meeting. Also a typographical error in the definition itself was corrected. See Appendix A. The level 2 categories were renamed to OPERATIONAL TESTING and DEVELOPMENTAL TESTING.

The proposed and accepted level 2 categories for UNIT PERFORMANCE were READINESS and HISTORICAL.

The MISCELLANEOUS category remained, but with no level 2 categories.

DATA STANDARDS was removed as a level 2 category under MISCELLANEOUS and made into a top level category. It was proposed that this be broken down into directories, metadata, and others as appropriate.

There was discussion as to whether there needs to be separate directories for Authoritative Data Sources and for Databases as previously planned or whether the Authoritative Data Sources data model is a subset of the Databases data model and the two could be melded into one directory. This will be dependent on agreement between the data models especially after consensus on results from Dave Danko's proposed changes to the survey which might introduce new data elements in the Authoritative Data Sources data model).

#### B. Data Sources Responsibilities

The definitions were presented for AUTHORITATIVE DATA SOURCE, and DATA CENTER. It was noted that the definition for DATA CENTER is really for an M&S DATA CENTER. Responsibilities for both DATA SOURCES and DATA CUSTOMERS were presented. Please see Appendix C for details. Comments and/or revisions are to be provided to Chien Huo NLT 11 January 1995. These definitions and responsibilities will be forwarded (incorporating any requested modifications) to the DMSO MSWG.

#### C. Status of JM&S Data Sources Survey

No new directory was distributed at the meeting. If changes are needed, please notify Mike Hopkins. Unfortunately, not much time was left for intense discussion on this agenda item. The work that Dave Danko did was presented for review. Contact either Mike Hopkins or Dave Danko if you have not received a copy of his extension to the survey questionnaire and would like one for review. Mr. Danko plans to forward a diskette to Peter Valentine so that the information will appear on Peter's WWW home page. Please note: If you have a copy, you have an action item to review his submission and comment on what you feel needs to be included in the Phase II survey questionnaire! For those people still remaining at the meeting, you are listed under the ACTION ITEMS section for this.

#### D. Other Business

Many thanks to Dave Danko and Cathy Corley for their excellent efforts in completing their action items. Also, thanks to Linda Calvert and Linda Gonzales for filling in for Iris Kameny while she was ill.

The NEXT MEETING is tentatively being scheduled for Thursday, 9 February 1300 to 1700 at IDA. Side note: This is during the week of the next D&R plenary session.

## 14.5 ACTION ITEMS

NOTE: All action items are due NO LATER THAN 11 January 1995 to CHIEN HUO unless otherwise noted.

### A. Taxonomy

#### **Jim Augins:**

- (1) Coordinate SCENARIO subcategory definitions with Cathy Corley

#### **Bill Bowers:**

- (1) Define JOINT FORCES and COMBINED FORCES under FORCE DESCRIPTION.
- (2) Provide all definitions of FORCE DESCRIPTION subcategory to Chien Huo (coordinate with Mike Hopkins and John Griffiths)

**Linda Calvert:** Fully define FINANCE category

#### **Cathy Corley:**

- (1) Provide definitions for subcategories of EQUIPMENT CHARACTERISTICS and EQUIPMENT PERFORMANCE.
- (2) Provide definitions for SCENARIO subcategories. (Coordinate with Jim Augins)
- (3) Provide definitions for TEST RESULTS subcategories.
- (4) Provide subcategory definitions for UNIT PERFORMANCE.

#### **Dave Danko:**

- (1) Provide definitions for TERRAIN and its subcategories.
- (2) Provide definitions for POLITICAL subcategories.

**John Griffiths:** Define INTELLIGENCE subcategory under FORCE DESCRIPTION. Provide definition to BILL BOWERS prior to January 11, 1995.

**Jim Hammond:** Provide definitions for EM/EO and its subcategories.

#### **Mike Hopkins:**

- (1) Define ARMY, NAVY, MARINE CORPS, and AIR FORCE subcategories under FORCE DESCRIPTION. Provide definitions to BILL BOWERS prior to January 11, 1995.
- (2) Provide definitions for SERVICE SUPPORT subcategories.

**Iris Kameny:** Further breakdown DATA STANDARDS and provide definitions for it and its subcategories.

#### **Eleanor Schroeder:**

- (1) Provide definitions for OCEANOGRAPHY and its subcategories.
- (2) Provide definitions for NAVIGATION and its subcategories. (Coordinate with Dave Danko)

**Pat Simes:** Provide definitions for HUMAN FACTORS subcategory.

#### **Richard Siquig:**

- (1) Provide definitions for SPACE/UPPER ATMOSPHERE and its subcategories. (Coordinate with William Jordan)
- (2) Provide definitions for WEATHER and its subcategories.

- B. Data Sources Responsibilities  
ALL WORKING GROUP MEMBERS: review definitions and responsibilities in Appendix C. Provide comments and/or modifications to Chien Huo NLT 11 January 1995.
- C. JM&S Data Sources Survey  
ALL WORKING GROUP MEMBERS: review Dave Danko's Phase II survey questionnaire. Send comments to Chien Huo NLT January 11, 1995. This action item is especially directed at the following people: JIM AUGINS, BILL BOWERS, CATHY CORLEY, DAVE DANKO, RON FARKAS, JIM HAMMOND, IRIS KAMENY, CHRIS OLSON, ELEANOR SCHROEDER, and RICHARD SIQUIG.
- D. Other  
Chien Huo: Consolidate responses received by 11 January 1995 and prepare package for submission to DMSO MSWG. Forward copies of final package to working group members.

#### **14.6 SUMMARY OF BRIEFING BY MS. MARY POLYDYS ON DoD SYSTEM INTERFACES AND DATA EXCHANGES**

Ms. Polydys is in the Staff Directorate for Enterprise Integration at DISA. She is the integration manager for cross-functional integration.

The following handouts were provided:

- (1) Information Paper entitled: STATUS UPDATE: SYSTEM INTERFACES AND DATA EXCHANGES COLLECTION EFFORT
- (2) SYSTEM INTERFACE/DATA EXCHANGE USER GUIDE dtd 10/24/94
- (3) SYSTEM INTERFACE/DATA EXCHANGE AND MIGRATION SYSTEM DATA ELEMENT INFORMATION COLLECTION INSTRUCTIONS dtd 10/19/94
- (4) PICK LISTS for Format 3-2 System/Application Format and Interface/Exchange Format dtd 11/10/94.

The Defense Information Systems Agency was tasked to support DASD(IM), DoD Principal Staff Assistants, J-6, the Services, and agencies in order to satisfy the requirements as dictated in the ASD(C3I) memorandum, System Interfaces and Data Exchanges, dated 2 September 1994. The main objective was to capture "source" data on system interfaces and data exchanges for all legacy systems, interim migration systems, and target or objective corporate systems in each functional area and enter selected migration system data element information into the Defense Data Repository System (DDRS).

The primary reason behind this effort was that although a system proponent could possibly not be aware of all the other systems that eventually use the data that was captured or created by their system, every system proponent should know the source(s) for data used in their own system. It was discovered that this was not always the case.

The Defense Integration Support Tools (DIST) was utilized to capture system/application information and initial interface/exchange information, in effect to be the repository for this information. A phased approach was used to collect the information in an effort to ensure data quality.

Phase I of this project entailed registration/validation of systems and/or applications. Existing information in the DIST was validated by the appropriate individuals. Those items that did not exist in the DIST but were "sanctioned" by ASD(C3I) and DASD(IM) as a designated migration system would be registered by personnel identified by the data collection coordinator for those systems. Phases II and III, which began on 10 December 94, registers the interfaces for those systems into DIST and registers the data elements for the designated migration system into DDRS. Analysis of the data occurs in Phase IV which is scheduled to begin on 1 Jan 95. In this phase, all sources will be identified. Statistics will be run to determine how many interfaces are reported on a particular system and this information will be provided to the system POC. In this way, the system proponent can see how many other systems are using their system's data and from where the data used in their system is coming.

In the long run, the primary beneficiary of the information will be the principal staff assistants and the people who support them in planning the evolution of the migration systems. The data collected will be integrated and easily available for use to the functional community and components and those in support of their activities.



## 14.7 APPENDICES

### A. M&S Taxonomy Definitions

1. FINANCE: TBD
2. ENVIRONMENT: data that represents the characteristics and features of the terrain, ocean, natural atmospheric conditions and man-made conditions.
3. EQUIPMENT: equipment is a discrete element (e.g., a sensor, weapon, tank, etc.) that one can make characteristics & performance measurements on.
  - a. EQUIPMENT PERFORMANCE: data that represents how well equipment performs its mission functions.
  - b. EQUIPMENT CHARACTERISTICS: data that represents the physical description of a piece of equipment.
4. TACTICS, TECHNIQUES AND PROCEDURES COGNITIVE: data that represents the following.
  - a. TACTICS: employment of units in combat; the ordered arrangement and maneuver of units in relation to each other or to the enemy.
  - b. DOCTRINE: fundamental principles by which military forces or elements conduct operations.
  - c. OPERATIONAL: description of processes for carrying out mission functions.
5. FORCE DESCRIPTION: data that represents the organization of personnel and equipment that comprises force composition, unit composition, echelonment, and command relationships.
6. POLITICAL: data that represents the influence of such factors as economics and demographics on the politics, especially the foreign policy of a state.
7. HUMAN FACTORS: data that represents the interaction of people with equipment, environment, or other specified conditions.
8. SERVICE SUPPORT: data that represents the assistance provided to sustain combat forces, primarily in the areas of administration and logistics.
9. SCENARIO: data that represents the description of the conditions and constraints for evaluation and rationale for those conditions.
10. TEST RESULTS: data that represents the examination, experimentation, or trial under specific conditions to prove the value, ascertain the nature, or ability of the thing under investigation to meet requirements.
11. UNIT PERFORMANCE: data that represents the force effectiveness.
12. DATA STANDARDS: TBD
13. MISCELLANEOUS: no breakdown at this time

### B. M&S Taxonomy - Updated

NOTE: \* denotes change made at this meeting

1. FINANCE:  
<subcategories to be determined>
2. ENVIRONMENT:
  - a. Terrain
    1. Boundaries
    2. Elevation
    3. Hydrography
    4. Industry
    5. Physiography
    - \*6. Populated Places
    7. Transportation
    8. Utilities
    9. Vegetation

- \*10. Soils/Surface Materials
- b. Oceanographic
  - 1. Acoustics
  - 2. Bathymetry
  - 3. Biologics
  - 4. Geology
  - 5. Gravity
  - 6. Geomagnetism
  - 7. Sea Surface
  - 8. Water Column & Currents
- c. Weather, Obscurants & Man-Made Conditions
  - \*1. Climatological
  - \*2. Diurnal
  - 3. Day/Night
  - 4. Man-Made Conditions (e.g. smoke)
- d. Space/Upper Atmosphere  
<subcategories to be determined>
- \*e. EM/EO
  - \*1. Natural Emitter Characteristics
  - \*2. Manmade Emitter Characteristics
  - \*3. Receptor Characteristics
  - \*4. Communications/Information Transfer
  - \*5. Propagation Effects
- f. Navigation
  - 1. Obstructions
  - 2. Landmarks
  - 3. Non-electronic
  - 4. Inertial
  - 5. Radio
  - 6. Satellite
  - 7. Limits
- 3. EQUIPMENT:
  - a. Equipment Characteristics
    - \*1. Air
    - \*2. Land
    - \*3. Sea
    - \*4. Space
    - \*5. Missiles
    - 6. Electronics
    - 7. Sensors
  - b. Equipment Performance
    - \*1. Air
    - \*2. Land
    - \*3. Sea
    - \*4. Space
    - 5. Missiles
    - 6. Electronics
    - 7. Sensors
- 4. FORCE DESCRIPTION:
  - \*a. Army: TO&E (Table of Organization and Equipment)
  - \*b. Marine Corps: TO/TE (Table of Organization/Table of Equipment)
  - \*c. Air Force: TA (Table of Allowances)
  - \*d. Navy: SAIL (Ship Ammunition Inventory List)  
COSAL (Coordinated Supply Allowance List)  
WSF (Weapons System File)

- e. Intelligence: foreign
- \*f. Joint Forces
- \*g. Combined Forces
- 5. POLITICAL:
  - a. Demographics
  - b. Policy
  - c. Economics
- 6. HUMAN FACTORS:
  - a. Sensory
  - b. Perception
  - c. Physical
  - d. Cognitive
  - e. Social
  - f. Emotional
- 7. SERVICE SUPPORT:
  - a. Logistics
  - b. Medical
  - c. Personnel
- 8. SCENARIO:
  - \*a. Army
  - \*b. Navy
  - \*c. Air Force
  - \*d. Marine Corps
  - \*e. Joint/Combined
  - \*f. Operations Other Than War
  - \*g. Pieces (Planning Guidance)
- 9. TEST RESULTS:
  - \*a. Operational Testing
  - \*b. Developmental Testing
- 10. TACTICS, TECHNIQUES, AND PROCEDURES (TTP) COGNITIVE:
  - a. Tactics
  - b. Operational
  - c. Doctrine
- 11. UNIT PERFORMANCE:
  - \*a. Readiness
  - \*b. Historical
- \*12. DATA STANDARDS:  
<subcategories TBD>
- 13. MISCELLANEOUS

C. Definitions and Responsibilities

- 1. DEFINITIONS:
  - a. **AUTHORITATIVE DATA SOURCE:** an organization designated and recognized as the producer of best-estimate values for one or more categories of data.
  - b. **M&S DATA CENTER:** an organization with a database recognized by some portion of the M&S community as having gone to authoritative sources, collected the best data possible for one or more M&S categories of data and made it available for M&S use.

2. **RESPONSIBILITIES:**

- a. **DATA SOURCES:** a data source has the responsibility of providing accurate, complete, and current data. The data source also has the responsibility of using and providing data to others as required and/or agreed to with their data sources or regulations and of safeguarding the data in accordance with established regulations. Data sources should be able to describe in detail their data and/or any application or system.
- b. **DATA CUSTOMERS:** customers should be responsible to use the data as agreed to in accordance with any formal arrangements such as MOAs and to properly safeguard the data as required by regulations. Customers should report to the data providers any suspected problems with the data or applications. If changes are made to any data handling applications they should be willing to share those changes. Customers should be willing to share in the cost of obtaining the data if required.

## APPENDIX F: ACRONYMS

A&T	Acquisition and Technology
ADSI	Augins Defense Services, Inc.
ADSs	Authoritative Data Sources
ADTs	Advanced Technology Demonstrations
AIMSSS	Army Information on Models, Simulations, and Studies System
AITs	Advanced Information Technology Services
AJP ACTD	Advanced Joint Planning Advanced Concept Technology Demonstration
ALSP	Aggregate Level Simulation Protocol
AMD	Allowance Manpower Document
AMI	ARMS Model Interface
AMSAA	Army Material Systems Analysis Activity
AMSMO	Army Model and Simulation Office
ANDs	Tagging Format
API	Application Program Interface
ARC	ARC Compression
ARL/UT	Applied Research Laboratories/University of Texas at Austin
ARMS	Automated Resource Management System
ARPA	Advanced Research Project Agency
ASC	ASCII Text File (Unix)
ASD	Assistant Secretary of Defense
ATD	Advanced Technology Demonstration
ATO	Air Tasking Order
AVCAL	Aviation Allowance List
BFTT	Battle Force Tactical Trainer
BMDO	Ballistic Missile Defense Organization
BPR	Business Process Re-engineering
BUFR	Binary Universal Format for the Representation of Meteorological Data
C3	Command Control Communications
C3I	Command Control Communications and Intelligence
C4I	Command Control Communications Computers and Intelligence
CATT	Combined Arms Tactical Trainer
CCTT	Close Combat Tactical Trainer
CDAd	Component Data Administrator

CDIF	CASE Data Interchange Format
CDIs	Constrained Data Objects
CECOM	Communications-Electronics Command
CENTCOM	U.S. Central Command
CFDB	Conventional Forces Database
CFS	Center for Standards
CGI	Common Gateway Interface
CIM	Center for Information Management or Corporate Information Management
CINC	Commander-in-Chief
CISS	Center for Information System Security
CLI	Call Level Interface
CNO	Center for Naval Operations
COLSA	Corporation
CONOPS	Concept of Operations
CORBA	Common Object Request Broker Agent
COSAL	Coordinated Supply Allowance List
COSBAL	Coordinated Shore Based Allowance List
CSC	Name of Company
CSL	Common Security Label
CSSE	Concurrent Systems Security Engineering
CSTO	Information Security Program
CTIS	Combined Terrain Information System
DAd	Data Administrator
DAPMO	Data Administration Program Management Office
DASP	Data Administration Strategic Plan
DBA	Database Administrator
DBF	DBase File (Version 3 or 4)
DBMS	Database Management System
DCE	Distributed Computer Environment
DDL	Data Definition Language
DDR	Defense Data Repository
DDR&E	Director, Defense Research and Engineering
DDRS	Defense Data Repository System
DED	Data Element Dictionaries
DEEM	Dynamic Environmental Effects Model
DEs	Data Elements

DGIWG	Digital Geographic Information Working Group
DGSA	Defense Goal Security Architecture
DIA	Defense Intelligence Agency
DIS	Distributed Interactive Simulation
DISA	Defense Information Systems Agency
DLG-E	Digital Line Graph-Enhanced
DLPCS	Data Link Processing and Control System
DMAFF	DMA Feature File
DMDC	Defense Manpower Data Center
DMS	Defense Message System
DMSO	Defense Modeling and Simulation Office
DOC	MS-Word (Windows)
DoD	Department of Defense
DoDD	Department of Defense Directive
DOI id	Domain of Interpretation Identifier
DoN	Department of Navy
DRTWG	Data and Repositories Technology Working Group
DSB	Defense Science Board
DSD	Data Sources Directory
DSI	Defense Simulation Internet
DSR	Data Standards and Repositories
DSRS	Defense Software Reuse System
DSU	Data Storage Units
DTR	Data Trouble Reports
E2DIS	Environmental Effects in Distributed Interactive Simulation
EA	Electronic Attack Environment
EP	Electronic Warfare Protection
EPS	Encapsulated Post-Script (Single Graphic)
ER1	ER/WIN Native Format
ERTWG	Environmental Representation Technology Working Group
ERX	ER/WIN ASCII Export Format
ES	Electronic Warfare Support
ETMO	Education, Training and Military Operations
EXCIMS	Executive Council on Modeling and Simulation
FACC	Feature and Attribute Coding Catalog
FDAd	Functional Data Administrator
FFRDCs	Federally Funded Research and Development Centers

FGDC	Federal Geographic Data Committee
FIPS 173	Federal Information Processing Standard/Spatial Data Transfer Standards
FOIA	Freedom of Information Act
GCCS	Global Command and Control System
GOTS	Government-off-the-Shelf
HLA	High Level Architecture
HQX	MAC??
HTML	Hyper Text Markup Language
HUMINT	Human Intelligence
I/DBTWG	Information/Database Technical Working Group
IDA	Institute for Defense Analysis
IDBMS	Integrated Database Management System
IDEF	Integrated Computer Aided Definition Language
IDEF0	IDEF Process Modeling Methodology
IMINT	Imagery Intelligence
iMSRR	Interim M&S Resource Repository
IRC	Internet Relay Chat
IRDS	Information Resource Dictionary System
IRM	Information Resource Management
IRR	Information Resources Repository
ISA	Company Name
ISO	International Organization for Standardization
ITWG	Information Technology Working Group
JDBE	Joint Database Elements
JIEO	Joint Interoperability Engineering Organization
JM&S	Joint Modeling and Simulation
JOPES	Joint Operations Planning and Execution System
JSIMS	Joint Simulation
JTF	Joint Task Force
JTF-ATD	Joint Task Force-Advanced Technology Demonstration
JWID	Joint Warrior Interoperability Demonstrations
JWSOL	Joint Warfare Simulation Object Library
LEEGCCS	Leading Edge Environment for Global Command and Control
M&S	Modeling and Simulation
MASINT	Measurement & Signature Intelligence
MC&G	Mapping, Charting, and Geodesy
MEL	Master Environmental Library



MIIDS	Military Intelligence Integrated Data System
MISSI	Multilevel Information System Security Initiative
MOA	Memorandum of Agreement
MSIM	Modeling and Simulation Information Management
MSIRR	Modeling and Simulation Information Resources Repository
MSIS	Modeling and Simulation Information System
MSMP	Modeling & Simulation Master Plan
MSRR	Modeling and Simulation Resource Repository
MSWG	Modeling and Simulation Working Group
NAAL	NAVSEA Ammunition Allowance List
NASA	National Aeronautics and Space Administration
NATE	North American and US Space Command Integrated C2 Analyst Test
NAVOCEANO	Naval Oceanographic Office
NDRI	National Defense Research Institute
NID	A Database Used by Tecnet
NIIP	National Industrial Information Infrastructure Protocols
NISMC	Naval Information Systems Management Center
NIST	National Institute of Standards and Technology
NRaD	Navy Research and Development
NRL	Naval Research Laboratory
NWTDB	Navy Warfare Tactical Database
OASIS	Operational Analysis and Simulation Interface System
ODBC	Object Database Consortium
ODBCS	Open Database Connectivity Standard
ODMG	Object Data Management Group
OMG	Object Management Group
OPSEC	Operational Security
OSD	Office of the Secretary of Defense
PCAT	Personal Computer Access Tool
PCTE	Portable Common Tools Environment
PDU	Protocol Data Unit
PIRR	Prototype Information Resources Repository
PMI	Production Modernization Initiative
POA	Naval Air Program Operating Allowance
PS	Post-Script Document
RCL	Rule Constraint Language
RDBM	Relational Database Management

RDBMS	Relational Database Management System
RFP	Request for Proposal
RLF	Reuse Library Framework
RTF	Rich Text Format (ASCII Exchange Format)
SAFORS	Semi Automated Forces
SAI	Subject Area Information
SDE	Standard Data Element
SEMP	System Engineering Management Plan
SGML	Standard Generalized Markup Language
SIGINT	Signals Intelligence
SIMDATAM	Simulation Data Management Simulation
SMIB	Security Management Information Base
SML	Structured Modeling Language
SOCOM	Special Operations Command
SPAWAR	A Navy Program
STOW	Synthetic Theater of War
SWAR	Solid Waste Automated Repository
SWG	Standards Working Group
TA	Table of Allowances
TADILS	Tactical Data Information Link
TAFIM	Technical Architecture Framework for Information Management
TBD	To be Decided
TCB	Trusted Computing Base
TCSEC	Trusted Computer Security Evaluation Criteria
TIGER	Topologically Integrated Geographic Encoding and Referencing
TIJ	Training Command
TO&E's	Table of Organization and Equipment
TO/TE	Table of Organization/Table of Equipment
TRAC	Training Command
TRADOC	Training and Doctrine Command
TRM	Technical Reference Model
TTP	Tactics, Techniques, and Procedures
TWGs	Technical Working Groups
TWISTIAC	Name of an Information Analysis Center that Supports Modeling and
TXT	ASCII Text File (MS-DOS)
UDI	Unconstrained Data Items
URL	Universal Resource Locator

USACOM	US Atlantic Command
USMTF	United States Message Text Format
UTSS	Universal Threat System for Simulators
VV&A TWG	Verification, Validation and Accreditation Technical Working Group
VV&A	Verification, Validation and Accreditation
VV&C	Verification, Validation and Certification
VVAROOM	VV&A Repository Online of Models and Simulations
WAIS	Wide Area Information Server
WGs	Working Groups
WP5	Word Perfect 5.x Document
WSF	Weapons System File
WWMCCS	World Wide Military Command and Control System
WWW	World Wide Web
Z	Unix Compression
ZIP	ZIP Compression Format